DOCUMENT RESUME

ED 251 258 RC 015 025

AUTHOR	Noy, Laura
TITLE	Protect Minnesota's Agricultural Land: Components and Activities for Elementary Students.
INSTITUTION	Minnesota Governor's Council on Rural Development, St. Paul.
PUB DATE	Sep 84
NOTE	254p.
PUB TYPE	Guides - Classroom Use - Materials (For Learner) (051) -- Guides - Classroom Use - Guides (For Teachers) (052)
EDRS PRICE	MF01/PC11 Plus Postage.
DESCRIPTORS	*Agricultural Production; Art Activities; *Conservation Education; Curriculum Enrichment; Elementary Education; Environmental Education; *Land Use; Language Arts; *Learning Activities; Mathematics Materials; Natural Resources; Outdoor Activities; Outdoor Education; *Science Activities; Social Studies; *Soil Conservation
IDENTIFIERS	*Minnesota

ABSTRACT

An endeavor to alert elementary teachers and students to the need to protect and conserve one of Minnesota's basic resources, soil, these supplementary instructional activities are designed for easy integration into science, social studies, language arts, mathematics, and art subject and skill areas. Each activity includes a brief description of the instructional method employed; background information for the instructor; list of needed materials, step by step procedures; recommended grade level; subjects from which concepts are drawn; skills; duration; recommended group size; setting (indoors and outdoors); key vocabulary; and a listing of points in the curriculum framework outline to which the activity corresponds either directly or indirectly. The activities are organized under seven topic areas: what is soil, relationship of soil to wind and water, relationship of soil to plants, soil productivity in Minnesota, planning for wise use of land, soil conservation and preservation, and land utilization (world food needs). The document also contains the curriculum framework in outline form, an illustrated vocabulary, a resource guide, activities by grade and subject area, and skill cross-references. The materials are also useful for conservation personnel, scout and 4H leaders, and other educators in non-school settings. (NEC)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED251258

PROTECT MINNESOTA'S AGRICULTURAL LAND

COMPONENTS AND ACTIVITIES FOR ELEMENTARY STUDENTS

NOV 1984
RECEIVED
ERIC/CRESS

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

- This document has been reproduced as received from the person or organization originating it.
- ✓ Minor changes have been made to improve reproduction quality.

- Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Laura Noy

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

RC015025

GCRD

GOVERNOR'S COUNCIL ON RURAL DEVELOPMENT

Governor's Council on Rural Development
900 American Center Building
150 East Kellogg Boulevard
St. Paul, Minnesota 55101
(612) 296-3993

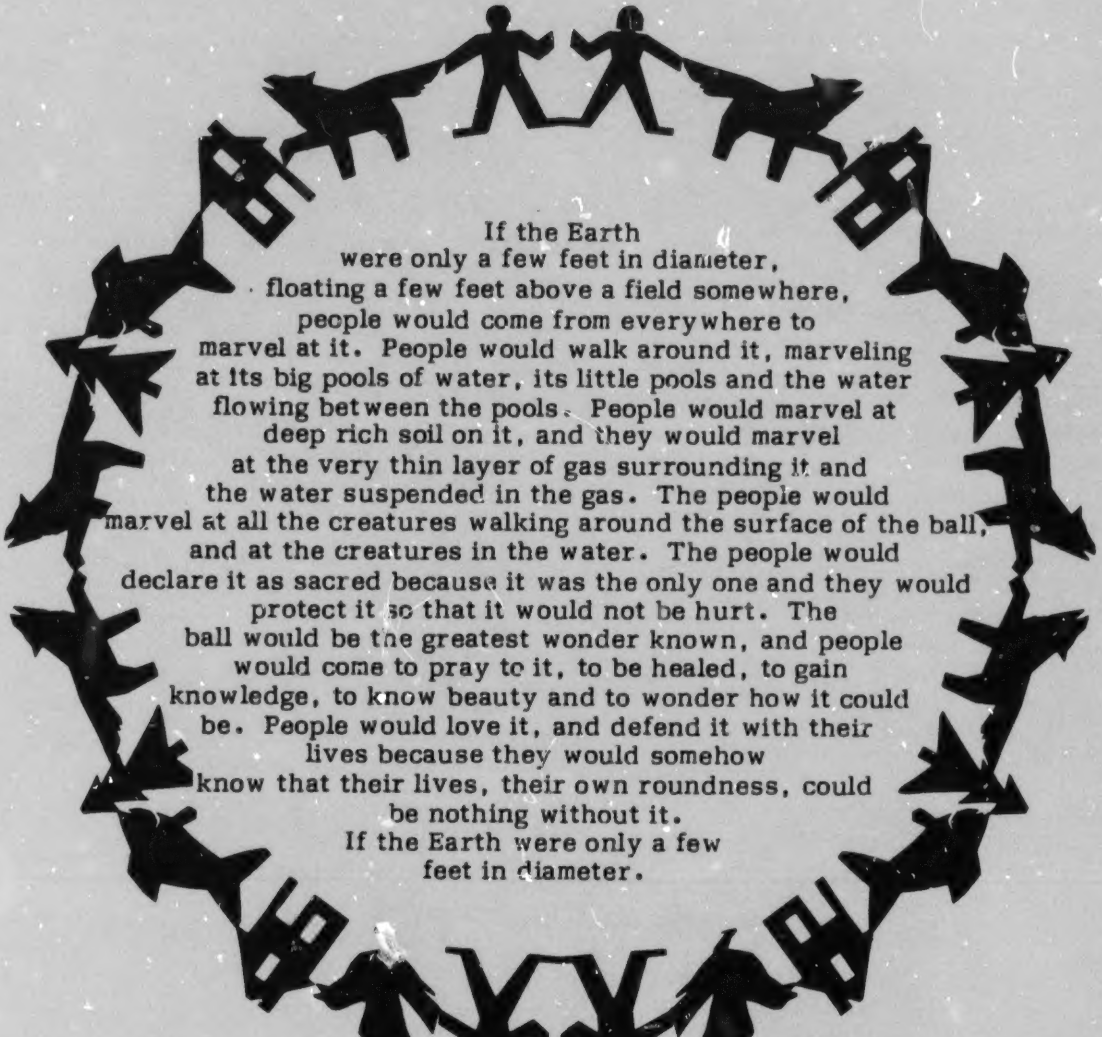
Principal Author: Laura Noy, S.S.N.D.

Graphics: John T. Lenertz Studio

Minnesota's Ag-Stravaganza was developed by the Governor's Council on Rural Development to assist in teaching urban and rural students about the need to protect the state's agricultural land from soil erosion and unplanned urban sprawl.

This newly developed curriculum enrichment materials, for kindergarten through grade six, are now available, free of charge, to elementary school teachers and resource personnel in Minnesota who attend a Teacher or Demonstration Workshop during the 1984-85 school year.

For workshop registration materials and more information on dates, locations, and times, please contact your Regional Soil and Water Conservation District Offices or Laura Noy, Governor's Council on Rural Development, 869 E. Fifth St., St. Paul, MN 55106. (612) 774-0500.



If the Earth were only a few feet in diameter, floating a few feet above a field somewhere, people would come from everywhere to marvel at it. People would walk around it, marveling at its big pools of water, its little pools and the water flowing between the pools. People would marvel at deep rich soil on it, and they would marvel at the very thin layer of gas surrounding it and the water suspended in the gas. The people would marvel at all the creatures walking around the surface of the ball, and at the creatures in the water. The people would declare it as sacred because it was the only one and they would protect it so that it would not be hurt. The ball would be the greatest wonder known, and people would come to pray to it, to be healed, to gain knowledge, to know beauty and to wonder how it could be. People would love it, and defend it with their lives because they would somehow know that their lives, their own roundness, could be nothing without it. If the Earth were only a few feet in diameter.

Graphic reproduced with permission of the Environmental Learning Center, Isabella, Minnesota.

TECHNICAL ADVISORY COMMITTEE ON AGRICULTURAL LAND PROTECTION CURRICULUM

Program Manager
Glynnis Jones

Lois Mann
Agricultural Extension Service

John Miller
Minnesota Department of Education

Dr. Edward C. Frederick, Provost
University of Minnesota Technical College

Roger Grosslein; Wayne Edgerton
Minnesota Department of Natural Resources

Laurence Collin, Chair
Governor's Council on Rural Development

Sandra Gardebring
Minnesota Pollution Control Agency

Ron Nargang, Executive Director
Soil and Water Conservation Board

Paul Day
State Future Farmers of America Advisor

Carmen Borgerding
Minnesota Environmental Education Board

Larry Hohbach
Minnesota Educational Association

Randy Voyles
Minnesota Federation of Teachers

Tom Adams
Minnesota School Boards Association

Mary Mattson, Principal
Minnesota Elementary School Principals' Association

Stephen Reckers
Minnesota State Planning Agency

CURRICULUM FRAMEWORK

This curriculum framework serves as the conceptual basis for the activities in **Minnesota's Ag-Stravaganza**. Each activity corresponds to one or more points in this outline either directly for the students or indirectly as background for the instructor. Sometimes the correspondence is direct; that is, the activity is designed to teach the underlying concepts. In other instances, the relationship is indirect; that is, the reference to the Curriculum Framework is made to provide additional background information for the instructor.

I. WHAT IS SOIL?

A. Awareness and Appreciation of Soil

1. Soil is composed of air, water, minerals and organic matter.
2. Air, water, and/or soil provide homes for all living things.
3. Soil, water, air and sunlight vary in many ways and combine to from numerous environments or habitats for living things.
4. Air, water and soil are being continually used and replenished (or returned) through recirculating processes or cycles.
   a. Carbon-oxygen-nitrogen cycle
   b. Rock cycle
   c. Water cycle

B. Texture is fineness or coarseness of soil. Texture determines how fast water will move through the soil and soak in, or how fast water will run off.

1. Sandy soil has large particles and feels gritty. Water drains quickly through sandy soil.
2. Clay has fine particles and feels sticky when wet. Clay absorbs moisture readily.
3. Loam is a mixture of sandy soil, clay and usually organic matter. The organic matter acts like a sponge to hold water.

C. The natural formation of soil is a slow and continuous process, taking up to 100 years or more to form one inch of topsoil.

1. Soil is formed with the assistance of plants and animals. Organic and mineral matter in the soil support bacteria and fungi which bring soil minerals into solution, making them available to the plants.
2. The earth's surface is constantly changing. Soil is formed by volcanic action, earthquakes, glacial action, chemical weathering, and physical weathering.
3. Varicus ways of soil formation create only a thin surface cover on the earth, on which all life depends.

II. RELATIONSHIP OF SOIL TO WIND AND WATER

A. Soil is a reservoir that can hold water.

1. Water tends to cling to soil particles and to spread through the earth"s materials by capillary action through soil pores or air spaces.
2. The water that percolates down through the surface layers of soil to lower layers of the earth's rocky cover is called groundwater.

B. Water is a very active and mobile resource; it is hard to capture and keep where it is wanted or to keep out of places where it is not wanted.

1. Natural watersheds are the pathways formed by water as it moves toward rivers and lakes.
2. When moving water slows down, it tends to deposit some of its load of soil, and when it speeds up, it can pick up more material.
3. Water readily dissolves and carries away a wide range of substances, and moving water picks up and carries in suspension particles of undissolved materials.
4. The length of the slope, as well as its steepness, affects the rate of runoff and soil erosion.

C. Soil erosion is essentially a process of wearing away and displacing soil.

1. Two major causes of soil erosion are movement by wind and movement by water.
2. Three types of soil erosion caused by water are sheet erosion, rill erosion and gully erosion.
   a. Sheer erosion removes soil in a somewhat uniform pattern. It is estimated that soil loss through sheet erosion will not be visibly noticeable until it exceeds 12 tons per acre per year or an inch in about 12 or 13 years.
   b. Rill erosion forms small channels when water concentrates into small rivulets in the field.
   c. Gully erosion forms deep, wide channels. Enormous amounts of soil can be lost when large gullies form.
3. Erosion caused by wind depends on soil characteristics and condition, climate, and vegetative cover.
4. Three types of wind erosion are saltation, suspension, and creep.
   a. Saltation is the movement of medium-sized soil particles in a series of low bounces.
   b. Suspension is the movement of small soil particles that are lifted by the wind and then carried long distances.
   c. Creep is the movement of large and heavy soil particles that are rolled along the surface by the wind.
5. Erosion reduces organic matter, nutrients, water retention capacity and aeration capacity in the soil.

D. The rate of erodibility of soil is determined by texture, slope, moisture content, cover, and sometimes animal activity.

E. Bare hilltops are vulnerable to wind and water erosion. Brown hilltops indicate loss of irreplacable topsoil.

F. Erosion in Minnesota is critical.

   1. Minnesota has 23 million acres of cropland.[1]
   2. Twenty-nine percent or 13.1 million acres of Minnesota's rural land has excessive erosion.[2]

III. RELATIONSHIP OF SOIL TO PLANTS

A. Soil is needed for most plant life.

   1. Soil provides a source of water for plants.
   2. Soil provides nutrients that help plant grow and reproduce.
   3. Soil provides mechanical support to help plants stand upright.
   4. Soil provides heat and air to allow seeds to grow and produce roots.

B. As a part of nature's cycles, portions of plants may return to the soil when the plants die, helping to maintain soil fertility.

   1. Humus is decomposed plants and animals in soil.
   2. Litter is the surface layer of forest floor in which leaves are slightly decomposed.
   3. Manure is animal excrement put on soil to fertilize it.
   4. Crop residue is corn stalks and husks, and grain chaff left in the field after harvest.

C. The decay of plant and animal remains normally builds soil from the surface downward.

D. Grasses are one of the best natural means for enriching the soil and for reducing erosion because of their root and stem structure, their resistance to adverse conditions, and their relatively dense growth.

IV. SOIL PRODUCTIVITY IN MINNESOTA

A. Fertile soil was partially responsible for the pattern of development and the speed of advancement of civilization.

B. Productive soil is the chief resource on which the agricultural industry depends.

C. Soil fertility varies with mineral content, bacterial and other organic populations, water supply and texture.

D. People alter the character of soil through farming practices such as plowing, fertilizing, draining, changing the vegetation and by reshaping the surface.

E. When soil is used for producing crops, it may be progressively robbed of both organic and inorganic materials, thus depleting its fertility. Adequate amounts of organic matter and plant nutrients must be returned to replace those used by crops or those removed by leaching and erosion.

F. When soil is allowed to deteriorate, crop productivity is reduced.

V. PLANNING FOR USE OF LAND IN MINNESOTA

A. The land is used in many different ways including: houses, stores, factories, streets, highways, parks, and farms.

1. People determine the use of land through manipulation or management in order to satisfy their wants.
2. Natural features such as slope, water, soil quality, and land cover also influence how the land will be used.
3. Land management practices in a community can be either good or bad and greatly influence the life-style of the people living there.
4. Stewardship assumes responsible care and management of our land and water resources. All people, not just farmers or developers, are responsible for land stewardship.

B. Agricultural land includes forests, pastures, wetlands, and croplands.

1. Forested areas provide wood for construction, fuel, and habitat for wildlife. Forests also help to reduce run off by protecting areas from flood and erosion.
2. Pastureland is important as a source of food for livestock, wildlife habitat, and as protection for soil from wind and water erosion.
3. Wetlands are: swamps, marshes, bayous, bogs, potholes, sloughs, and ponds.
    a. Wetlands are nature's sponge and help prevent flooding by providing a slow release reservoir for snow melt and heavy rains, and a last ditch source of moisture in time of drought.
    b. Wetlands are characterized by shallow or fluctuating water levels and an abundance of aquatic and marsh plants. They are also the nursery and sanctuary of 2% of the nation's waterfowl.[3]
    c. Since colonial time, nearly half of the wetlands in the United States have been drained.[4] In Minnesota approximately 75% have been drained since settlement time (1848).[5]
    d. Today 200-300 thousand acres of United States wetlands are destroyed each year.[5]
    e. Conservation agencies, mainly through state and federal governments, purchase threatened wetlands as soon as available funds permit.
    f. Minnesota wetlands, left here by the last glacier, are at the edge of the Prairie Pothole Region of North America.[7]
4. Croplands provide food for the world, and require wise management to prevent erosion and to maintain soil fertility.
    a. Climate and type of soil set practical limits on what crops can be raised.

b. All people in our modern world are dependent upon the skills of the farmer.

C. Land varies in its suitability for people's many uses.

1. In general, steep slopes should be left in grass or tree cover to prevent erosion.
2. Relatively flat land, while good for growing crops, is also often the most suitable for building homes and businesses.
3. Careful consideration should be given to areas containing sand or gravel deposits so that development does not preclude the use of these minerals for future construction projects, particularly road construction.
4. In some parts of the state, large forested areas suitable for growing trees are being converted to cropland.[8]
5. Wetlands provide a number of social benefits including: flood control, erosion control, waste assimilation, water supply, groundwater storage, wildlife habitat, fire breaks, recreation, and aesthetics.
6. Drained wetlands are often marginal agricultural land and unsuitable for use as building sites.
7. Pollution and destruction of groundwater may occur if development is not properly planned in groundwater storage areas.

D. Planning and zoning methods help people to determine how the land is used and therefore solve some of the land use problems they experience. The following simplified planning process is an effective method for solving problems:

1. Identify the major problems and issues facing the community.
2. Decide what the people want the community to look like in the future.
3. Establish goals that will help the community achieve the kind of community they want in the future.
4. Develop specific work tasks that will help the community achieve the goals they have established.
5. Develop rules or regulations that will ensure that the plan is properly implemented. (Zoning ordinance, subdivision regulations.)

E. The planning commission is usually the organization responsible for preparing the community's planning program.

1. The members of the planning commission should be representative of the local community in which they serve.
2. The planning commission recommends plans and programs to the city council who makes the final decision.
3. All citizens have a right and a responsibility to help the planning commission decide the future of their area.

F. Need for Planning and Zoning in Minnesota

1. Approximately 100 acres of agricultural land are taken out of production daily for a variety of development uses including: residential, commercial, industrial, and public uses.[9]
2. Scattered development near cities often requires more tax dollars for streets, sewers, water and other public services to be extended to outlaying homes and businesses.
3. Better cooperation among township, city, and county governments will help to improve planning.
4. Natural resources such as water, soil, and forested areas can be destroyed through unplanned development or inadequate plans and controls.

VI. SOIL CONSERVATION AND PRESERVATION

A. Soil erosion control requires: stewardship of the soil, adequate technology, an understanding of the erosion processes, good erosion control systems, skillful handling of farm machinery, and thorough knowledge of farming.

B. Conservation practices are needed to prevent water and wind erosion.

1. Crop rotation is a practice whereby farmers alternate crops instead of planting the same crop every year in the same field. Important nutrients in the soil are replenished and plant insects and diseases are controlled by crop rotation.
2. Strip cropping is a practice whereby farmers plant strips of sod crops (such as alfalfa) which protect the soil in between strips of row crops.
3. Terracing is a practice which is used on long slopes. Terraces break up long slopes into two or more shorter ones. This cuts down on water erosion because it interrupts the flow of water coming downhill.
4. Windbreaks are trees or shrubs planted in long strips to protect fields from wind.
5. Contour tillage is plowing around a hill rather than up and down over it. Contour tillage helps slow water runoff.
6. Conservation tillage is a practice which lessens disturbance of the soil. By leaving the residue of the crop as it is harvested, soil, water, fuel, and time are saved.
7. Grassy swales are patches of native grasses growing in lower levels of the field. This protects vulnerable soil from erosion.

C. Crop residue left on the soil helps in various ways.

1. Crop residue intercepts the falling rain so that the water reaches the ground only after it runs down the stems or drips off the leaves.
2. Crop residue protects the soil from wind and water erosion, retains more of the moisture received by slowing runoff, which increases infiltration and reducing evaporation.
3. Prevents raindrops from striking the soil.
4. Rain on bare soil breaks up soil clumps, leaving a compacted, dense surface that admits water slowly.

D. Compaction caused by improper tillage and/or heavy equipment reduced the soil's pore space and its ability to hold and percolate water.

VII. LAND UTILIZATION: WORLD FOOD NEEDS

A. The great masses of people on earth inhabit areas containing the most favorable combination of soil, water, and air.

1. The welfare of people is affected by the way land is used.
2. The erosion and misuse of productive top soil has helped to cause the disappearance of some nations.
3. Change in the fertility of surface soil has caused shifts in world population.
4. The processes of production, exchange, distribution and consumption of food are influenced by geography.

B. Issues involving land use are a product of cultural and social trends.

1. Ownership of land has been a symbol of power among nations.
2. Land is viewed as being either public or private.
   a. Public land is regulated by public legislation.
   b. Private land is viewed in various ways.
      (1) Some view private land as a legacy, to be passed on to future generations.
      (2) Others view private land as a possession from which gain and profit are possible.
3. In the United States, the number of farms has been decreasing; the average size of farms has been increasing.[10]

C. Though food is the most basic human need and human right, the hungry are increasing (both in absolute numbers and as a percentage of the world's people).[11]

1. In the Third World, twenty million people a year (mostly children) die each year from hunger and hunger-related diseases.[12]

2. In some U.S. inner cities, infant mortality rates linked to material malnutrition are as high as in some underdeveloped countries.[13]

D. Around the world, a privileged minority has economic control over land, jobs and other resources that people need to feed themselves.[14]

1. Hunger is not caused by scarcity, the world produces enough grain alone to feed every person 3,000 calories a day (as much as an average American eats).[15]
2. People go hungry when they do not have access to land to grow food or to jobs so they can earn money to buy food.[16]
   a. Some groups of Americans, including Minnesotans, are more likely to go hungry than others - minorities, children, seniors and women.[17]
   b. Being unemployed or having a limited income makes it hard for people to buy enough food, even though they may be intelligent, hardworking people.

E. To build a more just and democratic food system requires knowing the facts.[19]

1. People need to understand where their food comes from, how it gets to them, and who gets bypassed.[20]
2. People need to learn how to communicate with others, to analyze situations and to solve problems cooperatively.[21]

F. The Arithmetic of Poverty (from India)

Decide, mother,
who goes without.
Is it Rama, the strongest
or Baca, the weakest
who may not need it much longer
or perhaps Sita?
Who may be expendable.[22]

13

Footnotes

[1] "Data for Decisions," National Resource Inventory Fact Sheet, Minnesota Soil and Water Conservation Service, 1982.

[2] Ibid.

[3] "Statues of Waterfowl and Fall Flight Forecasts," joint document of United States Fish and Wildlife Service and Canadian Wildlife Service, July 25, 1984.

[4] Wetlands, Their Use and Regulations, Office of Technology Assessment (Washington, D.C.: March 1984).

[5] Ralph W. Tiner, Jr., Wetlands of the United States and Recent Trends, March 1984.

[6] Alan W. Wentz, Wetlands Values and Management, United States Fish and Wildlife Service and U.S. Environmental Protection Agency (Washington, D.C.: 1981).

[7] Map: "Minnesota Agricultural Economist," Agricultural Extension Service (University of Minnesota: March 1981), page 2.

[8] "Soil Degradation: Effects on Agricultural Productivity," National Agricultural Lands Study, National Association of Conservation Districts (Washington, D.C.: United States Government Printing Office, 1981).

[9] "Minnesota's Farmland: An Endangered Resource," (St. Paul: U.S.D.A. - Soil Conservation Service).

[10] Laura Rubin, Food First Curriculum, (San Francisco: Institute for Food and Development Policy, 1984).

[11] The Politics of Food (San Francisco: Ecumenical Peace Institute).

[12] Ibid.

[13] Ibid.

[14] Ibid.

[15] Ibid.

[16] Ibid.

[17] "Minnesota Poverty: The Measure of Poverty - Report 1," Association of Minnesota Counties and Minnesota Department of Economic Security (St. Paul: 1983).

[18] Ibid.

[19] Food/Hunger Micro Analysis Seminar (New York: Trannational Academic Program, 1977).

[20] Ibid.

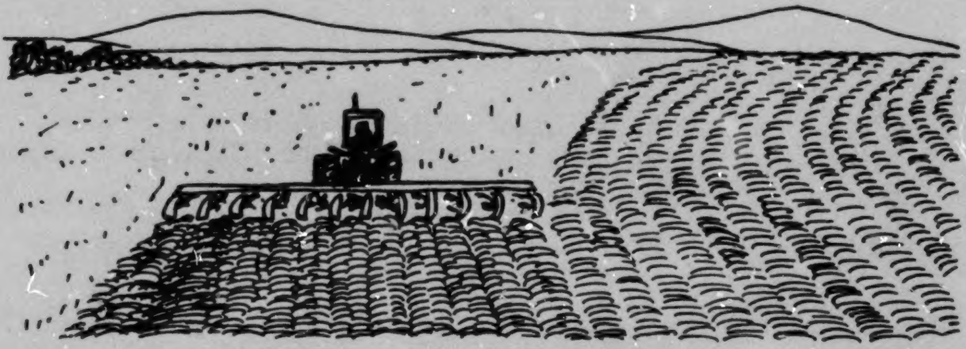
[21] Ibid.

[22] "Overcoming Hunger: The Challenge Ahead," Presidential Commission Report on World Hunger (Washington, D.C.: U.S. Government Printing Office, 1980).

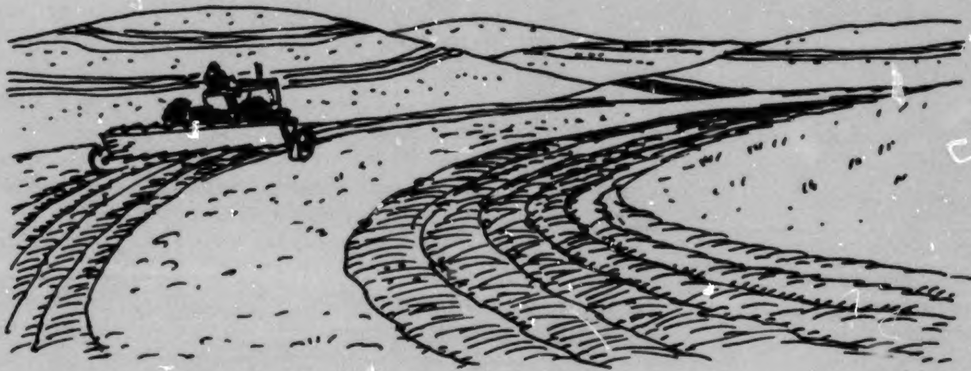
ILLUSTRATED VOCABULARY

acid rain:	Precipitation and microscopic dust particles, with acidic compounds attached to them, that fall from the skies. Acid rain can be toxic at high levels, affecting water supplies and eventually soil.
alfalfa:	An important deep-rooted legume, adaptable to widely varying conditions of climate and soil; it is grown principally for hay. See legume.
alkali:	A soluble mineral salt present in some soils in quantity detrimen--tal to agriculture.
bayous:	A creek, secondary waterway, or minor river, tributary to another river or other body of water.
biodegradeable:	Capable of being decomposed by processes of nature.
bogs:	A quagmire filled with decayed moss and other vegetable matter.
chisel plow:	Implement used to rough up a soil surface and keep crop residue mixed with soil to halt erosion from wind, rain and runoff.
clay soil:	Refers to either the submicroscopic mineral soil particles less than 0.002 millimeters in diameter or a soil material that contains 40% or more clay, less than 45% sand, and less than 45% silt; plastic when moist but hard when dry.
commercial development:	Land used for commerce, business; shopping malls, office buildings, grocery stores, etc.
commercial use:	In zoning, land designated for only commercial development. See commercial development.
compacted soil:	Any process by which soil particles are packed closely together, reducing the space between them and increasing the density of a given volume of soil.
compost:	Decomposed leaves, grass and other organic materials that are used as a soil conditioner and as a mulch to protect the soil against erosion.

conservation tillage:	Leaving protective crop residues on the soil surface; reduces soil losses from wind and water erosion by 50%; the residue covers the land until the growing crop is tall enough to reach across the rows and provide soil cover.



contour farming:	Is a system of farming around the hill instead of straight up and down.
contouring:	A method of erosion control. (See contour farming.)



creep erosion:	Large and heavy soil particles are rolled along the surface by the wind.
cropland:	Land used primarily to produce cultivated crops, close-growing crops, and fruits and nuts.
crop rotation:	Growing different crops in recurring succession on the same land.

BEST COPY AVAILABLE

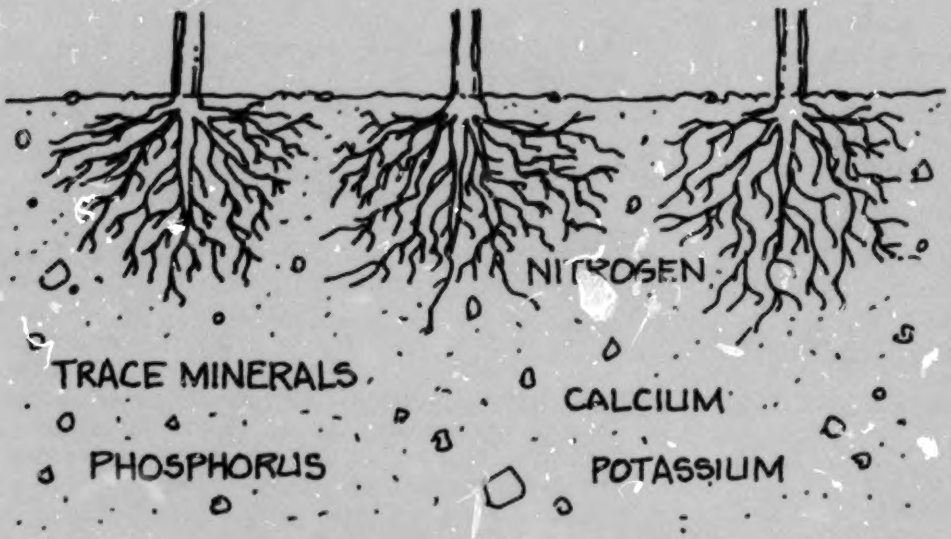
crop residue:	The part of a plant or crop left in the field after harvest.

cultivated land:	Land prepared for the raising of crops; tilled, loosened or broken up soil.
decomposition:	Disintegration; decay; the separation of a compound into simple elements or compounds.
diversified farm:	A farm which raises a variety of crops (oats, alfalfa, soybeans) and at least one type of animal (milk cows, beef cattle, hogs, or sheep).
divide:	A high ridge or area separating the flow of water to two or more adjacent drainage basins.
drainage area:	The area where the removal of surface water or groundwater from land takes place.
eroded soil:	Soil that has been worn away by wind or water.
erosion:	Detachment and removal of soil by wind or water.
evaporation:	The conversion of a liquid into gas; loss of moisture.
fencerow:	Grass and plants that are allowed to grow along fences. Because they are undisturbed year after year, roots are deep and able to absorb the rain readily.
fertile soil:	Contains a high level of nutrients available for plant use.
fertility:	Soils level of nutrients available for plant use.
fertilizer:	Any material added to the soil to supply nutrients for plant growth.

BEST COPY AVAILABLE

food chain	The relationship of organisms in which the smaller or more numerous are food for the larger ones.
forestland:	Land naturally suitable for the growth of trees; trees are needed on this type of soil to prevent erosion.
furrow:	A trench in the soil made by a plow.
glacial deposits:	Soil and sediment deposited or left by slow-moving glaciers.
grassland:	Land naturally suitable for the growth of grass; grass is needed on this type of soil to prevent erosion.
grassed waterway:	A natural or constructed shallow drainageway covered with grass; grassed waterways should be used wherever water collects in well defined channels and flows to an outlet; grassed waterways prevent gullies from developing.
groundwater:	The supply of fresh water under the earth's surface that forms a natural reservoir.
gully:	A deep channel cut by flowing water from rains or snowmelt.
gully erosion:	Deep wide channels are formed by flowing water; enormous amounts of soil can be lost when a large gully forms.
industrial development:	Land used for industry, factories.
industrial use:	In zoning, land designated for only industrial development. See industrial development.
infant mortality:	A statistic used to represent the annual number of deaths per 1,000 live births of infants under one year of age.
infiltration:	The flow of water into the soil.
legume:	Plant with an extensive root system that helps to bind the soil together, improving soil structure (clover, alfalfa, soybeans).
loam soil:	The name for soil containing moderate amounts of sand, silt, and clay (7 to 27% clay, 28 to 50% silt, and less that 52% sand).
manure:	Animal excrement with or without bedding or litter; excellent organic fertilizer.
marginal farmland	Land that is close to the lower limit of acceptability for growing crops.
moldboard plow:	A curved iron plate attached and a plowshare which lifts, turns, and pulverizes soil.

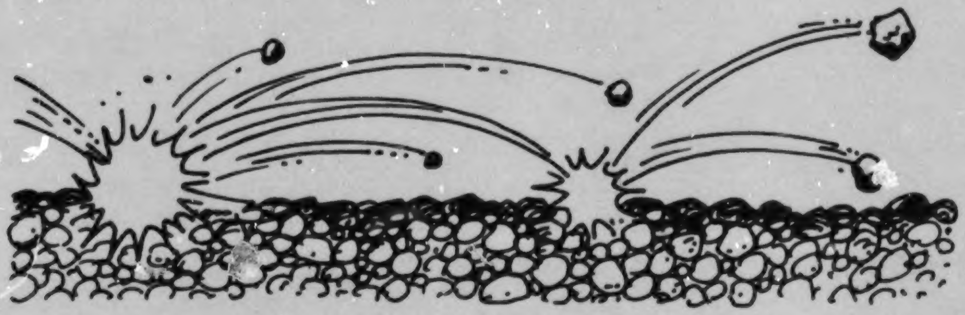
mulch:	A layer of plant residue or other material on the soil surface.
nodules:	A rounded mass, a little lump formed on the roots of certain legumes; nitrogen-fixing bacteria live in the nodules, providing useable nitrogen to the soil.
nutrients	An element or compound absorbed by green plants and used for growth.



one-crop farm:	A farm which raises, basically only one crop and no livestock.
organic matter:	Organic matter is material that lives, dies and returns again to the soil in order to begin all over again; it helps soil hold water instead of allowing run-off; it provides more air for the soil and makes the soil easier to manage.
pastureland:	An area established for animals to graze; also referred to as grassland.
percolation (perc):	Downward movement of water through soil.
permeability:	A soil's ability to allow water and air to move through it.
planning commission:	An organization, made up of members who represent the community, responsible for preparing the community's planning program for land use.
pollutants:	Any introduced substance that adversely affects the usefulness of a resource; making unclean the waters of lakes or streams or befouling the air with gases, vapors, dust, or noise.

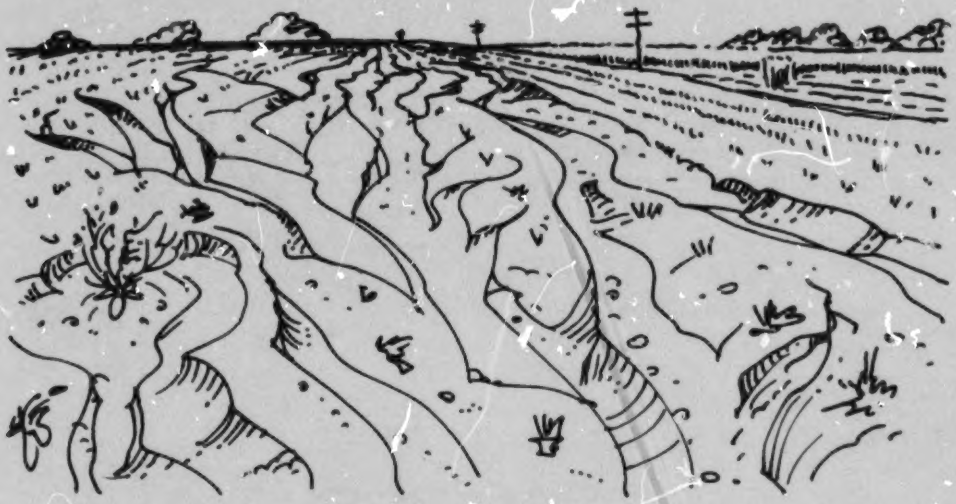
BEST COPY AVAILABLE

population density:	The number of people found in a designated area of land; e.g. the number of people per hectare (2.5 acres) in the United States is 1 (1979).
potholes:	A circular hole formed in the rocky beds of rivers by the grinding action of stones or gravel whirled around by water.
precipitation:	A deposit on the earth of hail, mist, rain, sleet, or snow.
prime farmland:	Land that has the best combination for physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops.
public development:	Land used for general use of a community; airports, parks, schools, hospitals, etc.
public use:	In zoning, land designated for only public development. See public development.
"raised beds":	(Sometimes called Deep Bed-Chinese or French Intensive method). A method of gardening in which the soil in a garden bed, four or five feet wide and as long as desired, is loosened by a careful series of deep digging; soil from the aisles between beds is used to raise the beds four or more inches; the beds are never walked on; this method is often used where there is a limited amount of land.
reservoir:	A place where water is collected and kept for use when wanted.
residential development:	Land used for homes; apartments, houses, condominiums, etc.
residential use:	In zoning, land designated for residential development. See residential development.
rill erosion:	The formation of small channels, is the result of surface run-off; when a rill gets deeper than one foot, it is called a gully. See sheet erosion.
saltation:	Medium sized soil particles move in a series of low bounces - wind erosion.



BEST COPY AVAILABLE

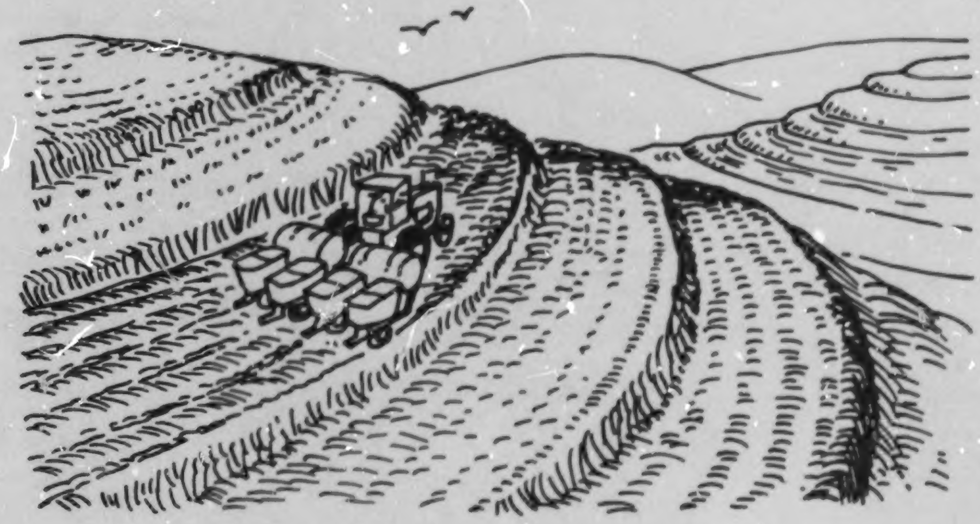
sandy soil:	Individual soil particles having a diameter between 0.05 and 2.0 millimeters; usually a light tan color.
sediment:	Soil particles moved by water - a product of erosion.
seepage:	Water escaping through or emerging from the surface of the soil.
septic tank:	A tank which the solid matter of continuously flowing sewage is disintegrated by bacteria.
sheet erosion:	Is the removal of a fairly uniform layer of soil be rain and runoff; it is estimated that soil loss through sheet erosion will not be visibly noticed until it exceeds 12 tons per acre.



slough:	(Also slew or slue.) A place of deep mud or mire, a swamp.
soil aeration:	The exchange of air in the soil with air from the atmosphere.
soil conservation:	Preserving and protecting the soil through supervision.
splash erosion:	The movement of topsoil by striking water.
springs:	Any source of water especially that of a stream; an issue of water from the earth.
strip cropping:	Practice of growing alternate strips of different crops in the same field; for controlling wind erosion, the strips are always on the contour, but in flat areas such as the Great Plains, strips are placed crosswise to the prevailing wind direction to control wind erosion.
subsoil:	The soil horizon (called B horizon) beneath the layer of darker-colored topsoil; it does not include the altered or unaltered parent material or underlying layers unlike the parent material.

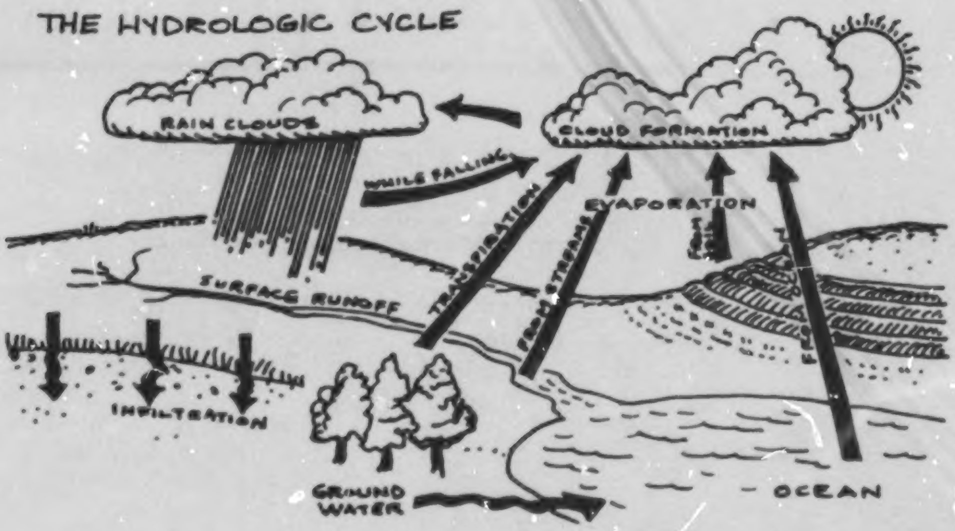
BEST COPY AVAILABLE

suspension:	Small soil particles are lifted by the wind and carried long distances. (Wind Erosion)
terraces:	An embankment or ridge constructed across sloping soils. The terrace intercepts surface run-off so that it can soak into the soil or flow slowly to a prepared outlet.
terracing:	Is a method of erosion control accomplished by constructing broad channels or trenches across the slope; a good terrace system can control 90% of the sediment from leaving the field.



topography:	The shape of an area's surface.
topsoil:	The darker surface layer of soil, often the plow layer.
toxic:	Poisonous.
toxic waste	Poisonous materials being thrown away as worthless after being used.
transpiration (in plants)	Release of moisture from plants into the air.
tributary:	A stream feeding a larger stream or lake.
urban sprawl:	The irregular extension of a city.
waste land:	Land which is labeled worthless.
water cycle:	The process of using the earth's water over and over again.

BEST COPY AVAILABLE


THE HYDROLOGIC CYCLE
RAIN CLOUDS
CLOUD FORMATION
WHILE FALLING
TRANSPIRATION
EVAPORATION
FROM STREAMS
SURFACE RUNOFF
INFILTRATION
GROUND WATER
OCEAN

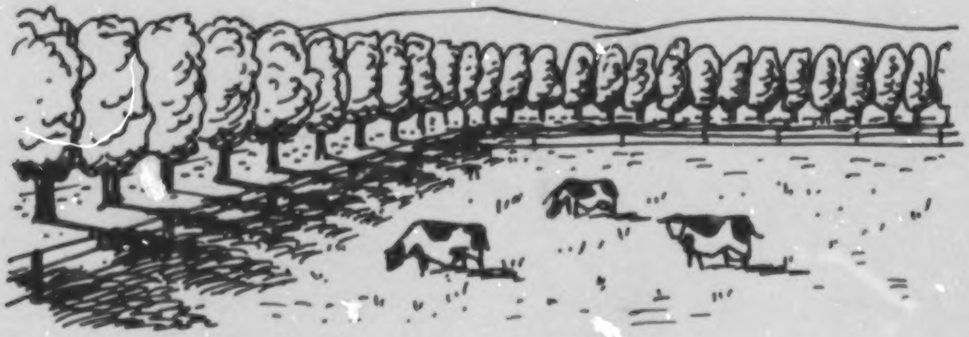
water erosion: Movement of topsoil by water, sheet, rill, and gully erosion.

watershed: All the land that drains into a single stream.

water table: The surface of the groundwater or the level below which the soil is saturated with water.

wetlands: A lowland area, such as a marsh or swamp, that is saturated with moisture, especially when thought of as the natural habitat of wildlife.

windbreak: A clump of trees or shrubs serving to break the force of the wind.



wind erosion: Movement of topsoil by wind. See creep, saltation, and suspension erosion.

zoning: The designation of a specific piece of land for a specific use - recommendations for use are made by a planning commission. See commercial use, industrial use, public use, residential use.

BEST COPY AVAILABLE

RESOURCE GUIDE

AGRICULTURAL EXTENSION SERVICES By Counties

(4H and Youth Development, Community and Natural Resource Development, Agriculture, Home Economics Family Living)

Aitkin (218) 927-2102
Courthouse
Aitkin 56431

Anoka (612) 755-1280
Bunker Hill
Anoka 55303

Becker (218) 847-7195
1000 8th St. SE., Box 663
Detroit Lakes 56501

Beltrami (218) 751-7300
Courthouse
Bemidji 56601

Benton (612) 968-7213
Courthouse
Foley 56329

Big Stone (612) 839-6151
342 N.W. Second Street
Ortonville 56278

Blue Earth (507) 625-3031
County Government Center
410 South 5th Street
Mankato 56001

Brown (507) 794-7993, 794-7994
County Extension Office S.E.
108 1/2 West Main Street
Sleepy Eye 56085

Carlton (218) 384-4281
115 Courthouse
Carlton 55718

Carver (612) 442-4496
233 South Olive
Waconia 55387

Cass (218) 547-3300
Courthouse
Walker 56484

Chippewa (612) 269-6521
Courthouse
Montevideo 56265

Chisago (612) 257-2982
Route 3, Box 1021C
North Branch 55056

Clay (218) 299-5020
Courthouse
Moorhead 56560

Clearwater (218) 694-6151
Box 100
Bagley 56621

Cook (218) 387-2282
Courthouse
Grand Marais 55604

Cottonwood (507) 831-4022
R.R. 2, Box 123
Windom 56101

Crow Wing (218) 829-1497
Crow Wing Service Building
Brainerd 56401

Dakota (612) 463-3302
Fairgrounds
4100 - 220th Street West
Farmington 55024

Dodge (507) 374-6435
Main Street
Box 159
Dodge Center 55927

Douglas (612) 762-2381
Courthouse
Alexandria 56308

Faribault (507) 526-2138
412 North Nicollet
Blue Earth 56013

Fillmore (507) 765-3896
Masonic Building
Preston 55965

Freeborn (507) 373-1475
200 Post Office Building
Albert Lea 56007

Goodhue (612) 388-8261
Courthouse
Red Wing 55066

Grant (218) 685-4820
Courthouse
Elbow Lake 56531

Hennepin (612) 559-4321
3410 Plymouth Blvd.
Plymouth 55447

Houston (507) 724-5211
Courthouse
Caledonia 55921

Hubbard (218) 732-3391
Courthouse
Park Rapids 56470

Isanti (612) 689-1810
Route 5, Box 19
East Highway 95
Cambridge 55008

Itasca (218) 326-9466
Courthouse
Grand Rapids 55744

Jackson (507) 662-5293
Main Street
Lakefield 56150

Kanabec (612) 679-3010
Courthouse
Mora 55051

Kandiyohi (612) 235-1485
905 West Litchfield
Box 977
Willmar 56201

Kittson (218) 843-3674
Courthouse
Hallock 56728

Koochiching (218) 283-2581
Courthouse
International Falls 56649

Lac Qui Parle (612) 598-3325
Courthouse
Madison 56256

Lake (218) 834-5681
Old Depot Building
520 South Avenue
Two Harbors 55616

Lake of the Woods (218) 634-1511
Courthouse
Baudette 56623

LeSueur (612) 357-2251
Courthouse
LeCenter 56057

Lincoln (507) 694-1470
Courthouse
Ivanhoe 56142

Lyon (507) 537-6702
Box 587
Courthouse
Marshall 56258

Mahnomen (218) 935-2226
Courthouse
Mahnomen 56557

Marshall (218) 745-5232
Courthouse
Warren 56762

Martin (507) 235-3341
115 South Park Street
Fairmont 56031

McLeod (612) 864-5551
Courthouse
Glenco 55336

Meeker (612) 693-2801
Courthouse
Litchfield 55355

Mille Lacs (612) 983-2561
County Office Building
Milaca 56353

Morrison (612) 632-2941
Old Courthouse
Little Falls 56345

Mower (507) 437-6616
Courthouse
Austin 55912

Murray (507) 836-6148
County Courts Building
Slayton 56172

Nicollet (507) 931-6800
501 South Minnesota Avenue
St. Peter 56082

Nobles (507) 372-7711
Post Office Box 758
Worthington 56187

Norman (218) 784-7183
Norman Co. Office Building
Ada 56510

Olmsted (507) 285-8250
1200 South Broadway
Suite 195
Rochester 55901

Otter Tail (218) 346-5750
222 - 2nd Avenue S.E.
Box 130
Perham 56573

West Otter Tail (218) 739-2271
Courthouse
Fergus Falls 56537

Pennington (218) 681-2116
Courthouse
Box 616
Thief River Falls 56701

Pine (612) 384-6156
Cassidy Building
Hinckley 55037

Pipestone (507) 825-5416
Box 669
Pipestone 56164

Polk - E. (218) 563-2465
City Hall
McIntosh 56556

Polk - W. (218) 281-1751
Courthouse
Crookston 56716

Pope (612) 634-5301
Courthouse
Glenwood 56334

Ramsey (612) 777-1327
2020 White Bear Avenue
St. Paul 55109

Red Lake (218) 253-2895
Courthouse
Red Lake Falls 56750

Redwood (507) 637-8323
Courthouse
Redwood Falls 56283

Renville (612) 523-2522
Courthouse
Olivia 56277

Rice (507) 334-2281
Courthouse
Faribault 55021

Rock (507) 283-4446
110 North Oakley
Luverne 56156

Roseau (218) 463-1052
308 Center Street West
Roseau 56751

(218) 749-7120
Courthouse Annex
402 3rd Street South
Virginia 55792

St. Louis County (218) 726-7512
Washburn Hall - Room 109
2305 East 5th Street
Duluth 55812

(218) 262-4841
Courthouse, Room 2
Box 68
Hibbing 55746

Scott (612) 492-2370
123 1st Street East
Jordan 55352

Sherburne (612) 441-1441
Sherburne County Courthouse
433 Jackson Avenue
Elk River 55330

Sibley (612) 237-2344
Courthouse
Box 207
Gaylord 55334

Stearns (612) 255-6169
2700 - 1st Street North
St. Cloud 56301

Steele (507) 451-8040
County Administration Annex
590 Dunnell Drive, Box 890
Owatonna 55060

Stevens (612) 589-4884
Agriculture Service Center
Highways 59 and 28 North
Morris 56267

Swift (612) 843-3796
Courthouse
Post Office Box 305
Benson 56215

Todd (612) 732-6181
Courthouse Annex
Long Prairie 56347

Traverse (612) 563-4515
Courthouse
Wheaton 56296

Wabasha (612) 565-4509
Courthouse
Wabasha 55981

Wadena (218) 631-2332
Courthouse
Wadena 56482

Waseca (507) 835-3610
122 3rd Avenue N.W.
Waseca 56093

Washington (612) 777-4411
2827 Lake Elmo Avenue N.
Lake Elmo 55042

Watonwan (507) 375-3341
Courthouse
St. James 56081

Wilkin (218) 643-5481
Courthouse
Breckenridge 56520

Winona (507) 454-5101
First Level Co. Courthouse
Winona 55987

Wright (612) 339-6881
Courthouse
Buffalo 55313

Yellow Medicine (612) 669-4471
1104-10th Avenue
Clarkfield 56223

COMMUNITY COLLEGES (Campuses Offering Agricultural Programs)

- Arrowhead Community College
- Austin Community College
- Hibbing Community College
- Mesabi Community College
- Rainy River Community College
- Willmar Community College
- Worthington Community College

DEPARTMENT OF NATURAL RESOURCES REGIONAL OFFICES

REGION 1	Rural Route 5, Box 41A Bemidji, Minnesota 56601 (218) 755-3955
REGION 2	East Highway 2, Box 388 Grand Rapids, Minnesota 55744 (218) 326-0311
REGION 3	1102 Willow Street Brainerd, Minnesota 56401 (218) 828-2605
REGION 4	Box 756, Highway 15 South New Ulm, Minnesota 56073 (507) 354-2196
REGION 5	2300 Silver Creek Road Northeast Rochester, Minnesota 55901 (507) 285-7430
REGION 6	1200 Warner Road St. Paul, Minnesota 55106 (612) 296-7523
CENTRAL OFFICE	Centennial Office Building Box 32 St. Paul, Minnesota 55155 (612) 296-4800

MINNESOTA DEVELOPMENT REGIONS

Region	Counties	Office
Northwest (1)	Kittson, Roseau, Red Lake, Marshall, Polk, Pennington, Norman	Crookston, MN (218) 281-1396
Headwaters (2)	Lake of the Woods, Beltrami, Clearwater, Mahnomen, Hubbard	Bemidji, MN (218) 751-3108
Arrowhead (3)	Koochiching, Itasca, St. Louis, Cook, Aitkin, Carlton	Duluth, MN (218) 722-5545
Region 5	Cass, Wadena, Crow Wing, Todd, Morrison	Staples, MN (218) 894-3233
Six East (6E)	Kandiyohi, Meeker, McLeod, Renville	Willmar, MN (612) 235-8504
Upper Minnesota Valley (6W)	Big Stone, Swift, Chippewa, Lac Qui Parle, Yellow Medicine	Appleton, MN (612) 289-1981
East Central (7E)	Mille Lacs, Pine, Kanabec, Isanti, Chisago	Mora, MN (612) 679-4065
Southwest (8)	Lincoln, Lyon, Redwood, Pipestone, Murray, Cottonwood, Rock Nobles, Jackson	Slayton, MN (507) 836-8549
Region 9	Sibley, Nicollet, LeSueur, Brown, Blue Earth, Waseca, Martin, Watonwan, Faribault	Mankato, MN (507) 387-5643
Metropolitan Council (11)	Anoka, Hennepin, Ramsey, Washington, Carver, Scott, Dakota	St. Paul, MN (612) 291-6359

MINNESOTA POLLUTION CONTROL AGENCIES

Minnesota Pollution Control Agency
1935 West County Road B-2
Roseville, Minnesota 55113

Pollution Control Agency
304 East River Road
Brainerd, Minnesota 56401
(218) 828-2492

Pollution Control Agency
116 East Front Street
Detroit Lakes, Minnesota 56501
(218) 847-1519

Pollution Control Agency
Government Service Center
320 Second Street
Duluth, Minnesota 55802
(218) 723-4662

Pollution Control Agency
Box 286
1104 East College Drive
Marshall, Minnesota 56258
(507) 537-7146

Pollution Control Agency
1200 South Broadway
Rochester, Minnesota 55901
(507) 285-7343

MINNESOTA STATE ASSOCIATION OF COUNTY PLANNING AND ZONING ADMINISTRATORS

Aitkin (218) 927-2132
Aitkin, MN 56431

Anoka (612) 421-4760
Anoka, MN 55303

Becker (218) 847-3938
Detroit Lakes, MN 56501

Beltrami (218) 751-7300
Box 248
Bemidji, MN 56601

Benton (612) 968-7060
531 Dewey Street
Foley, MN 56329

Big Stone (612) 839-3272
20 Southeast 2nd Street
Ortonville, MN 56278

Blue Earth (507) 625-3161
202 East Jackson
Mankato, MN 56001

Brown (507) 359-7900
New Ulm, MN 56073

Carlton (218) 384-4281, ext. 17
Carlton, MN 55718

Carver (612) 448-3435
Chaska, MN 55318

Cass (218) 547-3300
Walker, MN 56484

Chippewa (612) 269-6231
11th Street and Washington Ave.
Montevideo, MN 56265

Clay (218) 299-5041
807 North 11th
Moorhead, MN 56560

Chisago (612) 257-1300
Box 202
Center City, MN 55012

Clearwater (218) 694-6185
Bagley, MN 56621

Cook (218) 387-2282
Grand Marais, MN 55604

Cottonwood (507) 831-2458
Windom, MN 56101

Crow Wing (218) 829-1726
Brainerd, MN 56401

Dakota (612) 437-3191
1560 West Highway 55
Hastings, MN 55033

Dodge (507) 635-5193
Mantorville, MN 55955

Douglas (612) 762-2231, ext. 213
305 - 8th Avenue West
Alexandria, MN 56308

Faribault (507) 526-5145
Blue Earth, MN 56013

Fillmore (507) 765-4701
Preston, MN 55965

Freeborn (507) 373-5957
Albert Lea, MN 56007

Goodhue (612) 388-8261
Red Wing, MN 56531

Grant (218) 685-4494
Elbow Lake, MN 56531

Hennepin

Houston (507) 724-5211
Caledonia, MN 55921

Hubbard (218) 732-3890
Park Rapids, MN 56470

Isanti (612) 689-2757
237 - 2nd Avenue Southwest
Cambridge, MN 55008

Itasca (218) 236-9288
Grand Rapids, MN 55744

Jackson (507) 847-2240
Box 64
Jackson, MN 56143

Kanabec (612) 679-103[illegible]
18 North Vine
Mora, MN 55051

Kandiyohi (612) 235-2917
Willmar, MN 56201

Kittson (218) 843-2655
County Zoning Office
Courthouse
Hallock, MN 56728

Koochiching (218) 283-4427
Box 216
International Falls, MN 56649

Lac Qui Parle (612) 598-7444
Madison, MN 56256

Lake (218) 834-4352
Two Harbors, MN 55616

Lake of the Woods (218) 634-1945
Rural Route 11, Box 272B
Baudette, MN 56623

Le Sueur (612) 357-2251, ext. 20
Box 124
County Highway Building
LeCenter, MN 56057

Lincoln (507) 694-1441
Lake Benton, MN 56149

Lyon (507) 537-6728
607 West Main
Marshall, MN 56258

McLeod (612) 864-5551
Glencoe, MN 55336

Mahomen (218) 935-5669
Box 342
Mahomen, MN 56557

Marshall (218) 745-4851
Warren, MN 56762

Martin (507) 238-4757
Room 124 Security Building
Fairmont, MN 56031

Meeker (612) 693-8613
Litchfield, MN 55355

Mille Lacs (612) 983-2561
Milaca, MN 56353

Morrison (612) 632-2941
Little Falls, MN 56345

Mower (507) 433-1846
Austin, MN 55912

Murray (507) 836-8190
Slayton, MN 56172

Nicollet (507) 931-6800
Box 27
St. Peter, MN 56082

Nobles (507) 372-7711
Box 591
Worthington, MN 56187

Norman (218) 739-2271
Fergus Falls, MN 56537

Olmsted (507) 285-8215
1421 - 3rd Avenue Southeast
Rochester, MN 55901

Ottertail (218) 739-2271
Fergus Falls, MN 56537

Pennington (218) 681-1503
c/o C. Auditor
Thief River Falls, MN 56701

Pine (612) 629-6781
Pine City, MN 55063

Pipestone (507) 825-4246
Pipestone, MN 56164

Polk (218) 281-4186
Box 554
Crookston, MN 56716

Pope (612) 634-5301
Glenwood, MN 56334

Ramsey

Red Lake (218) 253-2598
Red Lake Falls, MN 56760

Redwood (507) 637-2811
Box 4
Redwood Falls, MN 56283

Renville (612) 523-1870
Olivia, MN 56377

Rice (507) 334-2281
Box 40
Faribault, MN 55021

Rock (507) 283-8009
County Highway Department
Luverne, MN 56156

Roseau (218) 463-1282
Roseau, MN 56751

St. Louis (218) 726-2626
5th Floor
Courthouse
Duluth, MN 55802

Scott (612) 445-7750
423 South Holmes
Shakopee, MN 55379

Sherburne (612) 441-1441
County Adm. Building
Elk River, MN 55330

Sibley (612) 237-2947
Gaylord, MN 55334

Stearns (612) 255-6152
Box 604
St. Cloud, MN 56301

Steele (507) 451-4842
590 Dunnell Drive
County Annex
Owatonna, MN 55060

Stevens (612) 255-6152
Box 347
Morris, MN 56267

Swift (612) 843-5257
2025 McKinney
Benson, MN 56215

Todd (612) 732-6181
Courthouse Annex
Long Prairie, MN 56347

Traverse (612) 563-4242
Wheaton, MN 56296

Wabasha (612) 565-7242
Wabasha, MN 55981

Wadena (218) 631-4455
Wadena, MN 56482

Waseca (507) 835-5600
Waseca, MN 56093

Washington (612) 439-3220
300 East Eugene Street
Stillwater, MN 55082

Watonwan (507) 375-3341
Box 396
St. James, MN 56081

Wilkin (218) 643-4981
419 Wilkin Avenue
Breckenridge, MN 56520

Winona (507) 454-3515
Winona, MN 55972

Wright (612) 682-3900
Buffalo, MN 55353

Yellow Medicine (612) 669-7524
Box 675
Clarkfield, MN 56223

MINNESOTA VOCATIONAL AGRICULTURE DEPARTMENTS IN HIGH SCHOOLS AND VOCATIONAL SCHOOLS

School and Instructors	School Number
Ada 105 East 4th Avenue Ada, MN 56510 Lowell Gunderson # Peter Revier	218- 784-4462 Ext. 26
Aitkin 306 - 2 St. NW Aitkin, MN 56431 Robert W. Lake	218- 927-2115 Ext. 40
Albany 140 - 3rd Street Albany, MN 56307 Michael Stenlund	612- 845-2171
Albert Lea 504 W. Clark Street Albert Lea, MN 56007 Kevin Muhlenbruch Robert Entorf	507- 373-2494
Albert Lea AVTI 211 W. Richway Drive Albert Lea, MN 56007 # Norm Fredin	507- 377-1628
Alden-Conger Box 516 Alden, MN 56009 1/2 # John C. Nelson	507- 874-3240
Alexandria Alexandria, MN 56308 Bernard Van Zomeren	612- 762-2141 Ext. 231
Alexandria AVTI 1600 Jefferson Alexandria, MN 56308 # Bernard Sonstegard Vern Taylor Jim Joerger Jerry Kalinowski Neil Wilts	612- 762-0221 Ext. 423
Amboy-Good Thunder Amboy, MN 56010 Don Hermanson (also at Mapleton)	507- 674-3079
Annandale Box 190 Annandale, MN 55302 LaWayne (Red) Petersen	612- 274-8208 Ext. 210
ANOKA-ISANTI--see St. Francis	
Anoka Landscape Center 7th Avenue North Anoka, MN 55303 Peter Tremaine	612- 421-1880 Ext. 222
Anoka AVTI Landscape Center 7th Avenue North Anoka, MN 55303 Terry Phillips Earl Ogren Lowell Blom Dick Robinson Tom Watson	612- 421-1980
Appleton 128 S. Hering Street Appleton, MN 56208 # Tim Holtquist Thomas Rach	612- 289-1611
Arlington-Green Isle P.O. Box 1000 Arlington, MN 55307 Gary Fokken (also at Gaylord)	612- 964-2292
Ashby Ashby, MN 56309 Leslie Zuehlsdorff	218- 747-2200
Atwater Atwater, MN 56209 Gordon Pennertz (also at Litchfield)	612- 974-8842

School and Instructors	School Number
Audubon Box 38 Audubon, MN 56511 Francis DeCock	218- 439-6119
Austin 202 - 4th Avenue N.E. Austin, MN 55912 Steve Maley	507- 433-0481
Austin AVTI 1900 - 8th Avenue N.W. Austin, MN 55912 # Ron Hayes + Don Walker John Drees Charles Uthke	507- 433-0600 Ext. 59
Bagley Bagley, MN 56621 Robert Boutain x Wilton (Bill) Wendlandt	218- 694-6122
Barnesville Barnesville, MN 56514 David Willard # David Bakken	218- 354-2228 Ext. 4
Barnum Barnum, MN 55707 Tim Theis # Darrel Ober (also at Willow River) x Wayne Stevens	218- 389-6978 or 389-6562
Battle Lake Battle Lake, MN 56515 Blaine Larson	218- 864-5215
Baudette (Lake of the Woods) Baudette, MN 56623 Robert A. Borchardt x# Gerald Ausmus	218- 634-2510
Belgrade Belgrade, MN 56312 Neil Pearson	612- 254-8211

School and Instructors	School Number
Belle Plaine Belle Plaine, MN 56011 Joel Larson	612- 873-2238
Bellingham Bellingham, MN 56212 Jon Olson	612- 568-2118
Bemidji Bemidji, MN 56601 Carol Carlson	218- 751-2160 Ext. 31
Bemidji AVTI Roosevelt and Grant Bemidji, MN 56601 # Jim Sackett # Steve Zeigler	218- 751-4137 Ext. 33
Benson Benson, MN 56215 Charles Erickson # Dick Bonde	612- 843-2710 Ext. 52
Bertha-Hewitt Bertha, MN 56437 Jerry Haase # Bob Anderson	218- 924-2500
Bigfork Bigfork, MN 56628 Harland Siiro	218- 743-3422
Bird Island/Lake Lillian Bird Island, MN 55310 Bennett Hillesheim # Roland Bjorklund (also at Danube, Olivia)	612- 365-3551
Blackduck Box 669 Blackduck, MN 56630 Ray Grundmeier Greg Robinson	218- 835-4214 Ext. 6
Blaine 12555 University Ave. NE Blaine, MN 55434 Bob Bowman	612- 755-7070 Ext. 53

School and Instructors	School Number
Blooming Prairie 202 - 4th Ave. NW Blooming Prairie, MN 55917 Mark Lewis Harold Ulrich # Eugene Francis	507- 583-4426
Blue Earth East 6th Street Blue Earth, MN 56013 Tami Arnold	507- 526-3215 ext. 224
Braham Box 488 Braham, MN 55006 Thomas Virnig	612- 396-3347
Brainerd 702 S. 5th Street Brainerd, MN 56401 Robert Groneberg Mark Haglin	218- 828-5278 828-5243
Brainerd AVTI 300 Quince Street Brainerd, MN 56401 Doug Keran Charles Widmark Mike Hager Jerry Liddle Wesley Urdahl Gary Carson	218- 828-5344 828-5321
Brandon Box 185 Brandon, MN 56315 Lydon Sletto	612- 524-2263
Breckenridge Breckenridge, MN 56520 Milan Drewlow	218- 643-2694 Ext. 27
Brewster Box 309 Brewster, MN 56119 #1/2 Gerald McConkey	507- 842-5951
Brooten Box 38 Brooten, MN 56316 Lawrence Putz	612- 346-2244

School and Instructors	School Number
Browerville Box 185 Browerville, MN 56438 Harlen Hokanson	612- 594-2272 Ext. 25
Brownton Box 338 Brownton, MN 55312 Ron Lindeman	612- 328-5214
Buffalo 109 - 4th St. N.E. Buffalo, MN 55313 Joe Schroeder	612- 682-5200 Ext. 190
Wright Vocational Center Buffalo, MN 55313 Brian Koenig Bradley Burkland	612- 682-4112
Buffalo Lake Box 278 Buffalo Lake, MN 55314 Kenneth L. Anderson	612- 833-5311
Butterfield-Odin Box 189 Butterfield, MN 56120 Ron Porath	507- 956-2771
Byron Box 157 Byron, MN 55920 Dan Hayes # Ken Levos	507- 775-2301
Caledonia Caledonia, MN 55921 Allen Dittmer Craig Colbenson	507- 724-3316 724-5706
Cambridge 430 N.W. Street Cambridge, MN 55008 Roger N. Eklund	612- 689-2020 Ext. 46
Campbell-Tintah Box 8 Campbell, MN 56522 Lee K. Daby	218- 630-5311

School and Instructors	School Number
Canby 307 - 1st Street W. Canby, MN 56220 Bill Delaney	507- 223-7226
Canby AVTI 1011 - 1st St. West Canby, MN 56220 x Dale Scholberg Luther Severtson Edwin Thomas Dennis Schentzel Richard Herbeck Dan Carlson Peter Girard Ron Stengel	507- 223-7252 Ext. 251
Cannon Falls 115 W. Minnesota St. Cannon Falls, MN 55009 John Hobert	507- 263-3331
Chaska 1700 Chestnut Street Chaska, MN 55318 Ben Lind Dennis Bjorklund (Carver-Scott Center) also at Waconia	612- 448-2854 Ext. 249
Chatfield Chatfield, MN 55923 Jerry Cleveland	507- 867-4210
Cherry Iron, MN 55751 Gary Rantala	218- 263-5497
Chisago Lakes Lindstrom, MN 55045 Jeff Lindeman	612- 257-1130 Ext. 42
Clara City Clara City, MN 56222 Dan Von Bank	612- 847-3752
Clarkfield Clarkfield, MN 56223 Steve Hotzler	612- 669-4424

School and Instructors	School Number
Climax Box 154 Climax, MN 56523	218- 857-2395
Clinton Box 361 Clinton, MN 56225 Donald E. Frederick	612- 325-5224 Ext. 6
Cold Spring - (Rocori) Cold Spring, MN 56320 Lee Winter # Dave Acheson	612- 685-8678 Ext. 48
Cook Cook, MN 55723 Mark Peterson	218- 666-5221
Cottage Grove (see Park Senior High School and Woodbury Senior High School)	
Cotton Cotton, MN 55724 Charles P. Johnsen	218- 482-3232
Cottonwood Box 107 Cottonwood, MN 56221 Paul Filzen	507- 423-5164 423-5434
Crookston Box 602 Crookston, MN 56716 Ron Dvergsten	218- 281-2144
Dakota AVTI 145 Street E & Akron Road. Rosemount, MN 55068 Dale Connolly Larry Braem Ed Plaster Diane Christenson - Secondary Dick Toft - Secondary Jeff Kleinboehl	612- 423-2281 423-8095
Danube Box 157 Danube, MN 56230 David Levine # Roland Bjorklund (also at Bird Island, Olivia)	612- 826-2286 826-2285

School and Instructors	School Number
Dassel-Cokato Highway 12 & Co. Rd. 100 Cokato, MN 55321 Wayne Ahlbrecht	612- 286-2106
Dawson-Boyd Dawson, MN 56232 James Hahn # Kurt Schoephoerster	612- 769-4586 or 4572
Delavan Box 125 Delavan, MN 56023 Dale Ripley (see also Winnebago)	507- 854-3201
Detroit Lakes 702 Lake Avenue Detroit Lakes, MN 56501 Ken Shroyer	218- 847-4491
Detroit Lakes AVTI Highway 34 East Detroit Lakes, MN 56501 # Clayton Olsen # Del Christensen Warren Koester Will Yliniemi # Jim Wylie	218- 847-1341
Doyer-Eyota Box 268 Eyota, MN 55934 James Hobbs	507- 545-2631 Ext. 8
Duluth AVTI 2101 Trinity Road Duluth, MN 55811 Wayne Fairchild Barb Patterson Pat Meehan Willie Morris Michael Ojard # Bruce Burton # Jim Takala Mike Rathe	218- 722-2801 Ext. 317
Eagle Bend Box K Eagle Bend, MN 56446 Dan Chase # William Ladwig	218- 738-6442
East Grand Forks AVTI Highway 220 North East Grand Forks, MN 56721 x Ken Melin Joe Grenier Dennis Wierima Don Gallagher	218- 773-3441
Eden Valley-Watkins Box 47 Eden Valley, MN 55329 Colin Berg	612- 453-2900 453-6721
Elbow Lake 411 - 1st St. S.E. Elbow Lake, MN 56531 Jeff Demmer	218- 685-4477
Elk River 400 School Street Elk River, MN 55330 Marvin Ziner	218- 441-1003 Ext. 154
Ellendale-Geneva Box 217 Ellendale, MN 56026	507- 684-3191 684-3181
Evansville Evansville, MN 56326 Tim Fenlason	218- 948-2241
Fairfax Box 489 Fairfax, MN 55332 Richard Beltz	507- 426-7251
Fairmont Fairmont, MN 56031 Scott Sieg	507 238-4411 Ext. 74
Faribault 330 - 9th Ave. N.W. Faribault, MN 55021 Doug Augustin	507- 334-5527

School and Instructors	School Number
Faribault AVTI	507-
1225 S.W. 3rd St.	334-3965
Faribault, MN 55021	332-7444
# Dean Hanson	
# Kenneth Stassen	
Carl Ziebarth	
Kenny Ingalson	
800 Denmark Avenue	463-7193
Farmington, MN 55024	Ext. 40
William Turner	
Fergus Falls	218
Fergus Falls, MN 56537	736-6971
#1/2 Curt Stillwell	Ext. 63
x Lambert Schilling	
#1/2 Phil Toedter	
Fertile	218-
Fertile, MN 56540	945-6931
David Swenson	Ext. 3
# Ron Salber	Ext. 9
Floodwood	218-
Box 287	476-2285
Floodwood, MN 55736	
Ralph Zauhar	
Foley	612-
520 Dewey Street	968-6251
Foley, MN 56329	968-7142
Randy Stacy	
# Kenneth Johnson	
Forest Lake	612-
6101 Scandia Trail	464-3313
Forest Lake, MN 55025	Ext. 134
Loyal M. Hyatt	
Mark Hill	
Fosston	218-
Fosston, MN 56542	435-6335
Reid Wahlin	435-6656
# Doug Fjerstad	
Frazee-Vergas	218-
Box 186	334-2981
Frazee, MN 56544	
Berry Bjornson	
Ken Hammer	

School and Instructors	School Number
Freeborn	507-
Box 155	863-2310
Freeborn, MN 56032	
Louise Worm	
Fridley	612-
6000 W. Moore Lake Drive	571-6000
Fridley, MN 55432	Ext. 123
LeRoy Block	
1/2 Brent Rach	
Fulda	507-
Fulda, MN 56131	425-2514
Carl Hennager	
# Mel Faltinson	
Garden City	507-
Welcome Memorial H.S.	546-3527
Garden City, MN 56034	
Randy Grupe	
Gaylord	612-
Gaylord, MN 55334	237-2973
X# Leo K. Lick	
Gary Fokken (also Arlington)	
Gibbon	507-
Gibbon, MN 55335	834-6501
Steve Zenk (also at Winthrop)	
Glencoe	612-
Glencoe, MN 55336	864-5153
Gene Moske	Ext. 23
# Kenneth Stenzel	
Glenville	507-
Glenville, MN 56036	448-2982
Kim Meyer	
Glenwood	612-
Glenwood, MN 56334	634-4527
Ronald G. Nelsen	634-4946
Gonvick	218-
Gonvick, MN 56644	487-5262
Kenneth Oraskovich	
Goodhue	612-
Goodhue, MN 55027	923-4447
Alan (Lee) Thompson	

School and Instructors	School Number
Goodridge Goodridge, MN 56725 # Wallace Shodean	218- 378-4133
Grand Rapids Grand Rapids, MN 55744 John E. Anderson # Richard Peterson	218- 326-5801
Granite Falls 450 - 9th Avenue Granite Falls, MN 56241 Darell Willson	612- 564-4081
Granite Falls AVTI Granite Falls, MN 56241 # Mike Resvick # Neale Deters	612- 546-4511 Ext. 33
Greenbush Greenbush, MN 56726 Roger Dvergsten	218- 782-2231 Ext. 7
Hallock Hallock, MN 56728 Matthew Mootz	218- 843-3683
Halstad (West High) Halstad, MN 56548 Neal Sundet	218- 456-2152
Hancock Hancock, MN 56244 Tim Dolan	612- 392-5621
Harmony Harmony, MN 55939 Craig McCallum	507- 886-6464
Hastings Hastings, MN 55033 John DeWall Tom Faust	612- 437-6111 Ext. 313
Hawley Hawley, MN 56549 Dennis W. Olsen # John Hest	218- 483-4965

School and Instructors	School Number
Hayfield Hayfield, MN 55940 Frank A. Moon # Curtis Berg	507- 477-3235
Hector Hector, MN 55342 Doug Hoseck	612- 848-2232 848-2236
Hendricks Hendricks, MN 56136 Dean Gronemeyer	507- 275-3115
Henning Henning, MN 56551 Brad Hanson # Charles Erickson	218- 583-2733
Herman Herman, MN 56248 Vern Mortenson	612- 677-2291
Hibbing Hibbing, MN 55746 # Raymond White	218- 263-9274 or 3675 Ext. 51
Hills-Beaver Creek Hills, MN 56138 Greg DeWandel # Wendell Erickson	507- 962-3241
Hinckley Hinckley, MN 55037 Lance Hagman	612- 384-6242
Hoffman-Kensington Hoffman, MN 56339 Chuck Ennen	612- 986-2033
Holdingford Holdingford, MN 56340 Arlynn Lawrenz Mark Stai	612- 746-2222
Houston 306 W. Elm St. Houston, MN 55943 Craig Jameson	507- 896-3161

School and Instructors	School Number
Howard Lake-Waverly	612-
Howard Lake, MN 55349	543-3471
Jack LaValla	Ext. 29
Hutchinson	612-
Hutchinson, MN 55350	587-2151
Gary Brinkmeier	Ext. 30
Hutchinson AVTI	612-
200 Century Avenue	587-3636
Hutchinson, MN 55350	Ext. 204
Dennis Bergquist	
Larry Gram	
Paul Kobernusz	
Ivanhoe	507-
Ivanhoe, MN 56142	694-1540
Mark Paluck	
Jackson	507-
Jackson, MN 56143	847-3320
Steve Dykstra	Ext. 257
Jackson AVTI	507-
401 W. Street	847-3320
Jackson, MN 56143	
+ John Murray	Ext. 211
x# Doug O'Neil	Ext. 213
Richard Amendt	
# Charles Asman	Ext. 214
Keith Roos	
Charles Lucht	
Jasper	507-
Jasper, MN 56144	348-3011
Brad Augustin (also at Pipestone)	
Karlstad	218-
Karlstad, MN 56732	436-2261
Robert Whippler	
Kasson-Mantorville	507-
Kasson, MN 55944	634-2961
Warren Kahler	
Kenyon	507-
Kenyon, MN 55946	789-6186
John Shelstad	
# Jerry Bartel	

School and Instructors	School Number
Kerkhoven-Sunberg	612-
Kerkhoven, MN 56252	264-5801
Norris Austvold	
Kimball	612-
Kimball, MN 55353	398-7700
Dennis A. Voyles	
Lake Benton	507-
Lake Benton, MN 56149	368-4235
Ronald Voelker	
Lake City	612-
Lake City, MN 55041	345-4551
Ralph Lentz	Ext. 51
Lake Crystal	612-
Lake Crystal, MN 56055	726-2110
Norm Sieling	726-2823
Lakefield	507-
Lakefield, MN 56150	662-5840
Jim Molenaar	662-5743
# Harry Gerdes	
Lamberton	507-
Lamberton, MN 56152	752-7361
Ronald Kelsey	
Lancaster	218-
Lancaster, MN 56735	762-5400
# Mark Prosser	
Lanesboro	507-
Lanesboro, MN 55949	467-2175
Vernon W. Groen	
LeCenter	612-
LeCenter, MN 56057	357-4769
Larry Hohbach	
LeRoy-Ostrander	507-
LeRoy, MN 55951	324-5741
Richard Schaufler	Ext. 9
# Wayne Pike	
LeSueur	612-
LeSueur, MN 56058	665-3305
Ken Swanson	Ext. 226
	665-6057

School and Instructors	School Number
Lewiston	507-
Lewiston, MN 55952	523-2191
Richard Finger	
# Loyal Hoseck	
x Paul Gardner	
Litchfield	612-
901 North Gilman	693-2424
Litchfield, MN 55355	Ext. 34
Dan Martens	
# Larry Oraskovich	
1/2 Gordon Pennertz	
(also Atwater)	
Little Falls	612-
Little Falls, MN 56345	632-2921
Louis Jelinski	Ext. 306
Dave Stish	
David Ploof	
Long Prairie	612-
Long Prairie, MN 56347	732-2194
Dale Carlson	Ext. 43
# Robert Johnson	
x Lloyd Laine	
Luverne	507-
Luverne, MN 56156	283-2811
Meldon Kloster	
# James Ouverson	
Mabel-Canton	507-
Mabel, MN 55954	493-5422
Carlyn G. Kraabel	
Madelia	507-
Madelia, MN 56062	642-3231
Brad Schloesser	642-3768
# Charles Worm	
Madison	612-
Madison, MN 59256	598-7551
Brent Baumgard	
# Ralph Butterfield	
Mahnomen	218-
Mahnomen, MN 56557	935-5846
Dale Erickson	

School and Instructors	School Number
Mankato (East)	507-
Mankato, MN 56001	387-5671
Bernard Kahnke	Ext. 248
Mankato AVTI	507-
1920 Lee Boulevard	625-3441
Mankato, MN 56001	Ext. 49
+ Delbert J. Hodgkins	
Gordon Jindra	
Lyle D. Phelps	
Bernard Snaza	
Paul Gorman	
# Paul Callanan	
# Dennis Jackson	
Larry Lundblad	
Robert Cramer	
Maple Lake	612-
Maple Lake, MN 55358	963-3021
Becky Waddel	
Mapleton	507-
Mapleton, MN 56065	524-3917
Don Hermanson (also at Amboy)	
Marietta	612-
Box 145	668-2550
Marietta, MN 56257	
Pat Kearney	
Marshall	507-
Marshall, MN 56258	532-6480
# Dennis Schroeder	532-3181
Terry Week	
Maynard	612-
Maynard, MN 56260	367-2397
Jon Rowe (also at Montevideo)	
Mazeppa	507-
Mazeppa, MN 55956	843-2135
Jeff Heitmann	843-3485
Medford	507-
Medford, MN 55049	451-5250
J. Charles Ripley	

School and Instructors	School Number
Melrose	612-
Melrose, MN 56352	256-4224
Brad Bigalke	Ext. 28
Tom Sedgeman	
# Michael Foley	
Menahga	218-
Menahga, MN 56464	564-4141
Norman Peterson	
Milaca	612-
Milaca, MN 56353	983-2121
W.J. Hendrickson	
Dene Byers	
# John (Bob) Larson	
Milroy	507-
Milroy, MN 56263	336-2564
Dale P. Trulock (also at Walnut Grove)	
Minneapolis	612-
Agri-Business Vo-Center	348-6062
4717 Dowling St. S.	
Minneapolis, MN 55406	
Norm Busse	
Montevideo	612-
13th St. & William Ave.	269-8833
Montevideo, MN 56265	269-9297
Tim Rademacher	
Kevin Hansen	
Jon Rowe (also at Maynard)	
# Myron R. Warner	
# Norman Brakken	
Montgomery	612-
101 - 2nd Street N.E.	364-5252
Montgomery, MN 56069	
Dan Hoffman	
Ira Beckman	
Moorhead AVTI	218-
1900 - 28th Avenue S.	236-6277
Moorhead, MN 56561	Ext. 269
# Richard Morgan	
Harland Hatfield	

School and Instructors	School Number
Mora	612-
Mora, MN 55051	679-2424
Roger Peterson	Ext. 71
Morris	612-
Morris, MN 56267	589-4400
Tim Lippert	
Motley	218-
Motley, MN 56466	352-6471
Charles I. Funk	
Mountain Lake	507-
Mountain Lake, MN 56159	427-2323
Tom Appel	
New London-Spicer	612-
New London, MN 56273	354-2255
Virgil Hawkinson	Ext. 28
Darrel Rupp	
New Prague	612-
New Prague Senior High	758-2582
721 Central Avenue N.	Ext. 40
New Prague, MN 56071	
John W. Gintner	
# Maynard Harms	
New Richland	507-
New Richland, MN 56072	465-3205
Lee Mendenhall	
# Mark Worthley	
New Ulm	507-
New Ulm, MN 56073	354-2034
Larry J. Klingbeil	354-2018
# Layton G. Peters	
Frank Stuckey	
Peter Neigebauer	
New York Mills	218-
New York Mills, MN 56567	385-2655
Deland A. Porath	
Nicollet	507-
Nicollet, MN 56074	225-3691
Robin Schwieger	225-3448

School and Instructors	School Number
916 AVTI 3300 Century Avenue White Bear Lake, MN 55110 Leslie Dorendorf Bob Rannells	612- 770-2351 Ext. 274-275
North Branch North Branch, MN 55056 James Naggatz	612- 674-7001 Ext. 282
Northfield Northfield, MN 55057 Lowell Miller	507- 663-0630 663-0644
Northome Northome, MN 55661 Bernard Uran	218- 897-5275
Norwood-Young America Central High School Norwood, MN 55368 Jim Swiggum	612- 467-2272
Ogilvie Ogilvie, MN 56358 Allan Ambrose	612- 272-4431
Heron Lake-Okabena Okabena, MN 56161 Keith Place	507- 853-4507
Olivia Olivia, MN 56277 # Roland Bjorklund (also at Bird Island, Danube)	612- 523-1031 Ext. 24
Onamia Onamia, MN 56359 Mary Pat Sorvick	612- 532-4174 Ext. 27
Orr Orr, MN 55771 Jerry Hovi	218- 757-3225
Ortonville Ortonville, MN 56278 Phillip A. Iverson	612- 839-6181

School and Instructors	School Number
Osakis Osakis, MN 56360 Leland Wilken # Mark Reick	612- 859-2191
Owatonna Owatonna, MN 55060 Glenn Edin Brian Kosel # Victor Richardson	507- 451-4710 Ext. 53
Park Senior High 900 - 3rd Street Cottage Grove, MN 55016 Dean Hauschildt	612- 459-5571 Ext. 1171
Parkers Prairie Parkers Prairie, MN 56361 Mike McDaniel	218- 338-6011
Park Rapids Park Rapids, MN 56470 Craig Paskvan x# Wendell Francis	218- 732-3333 Ext. 414
Paynesville Paynesville, MN 56362 William R. Ryan # Wallace Payne	612- 243-3761
Pelican Rapids Pelican Rapids, MN 56572 Bill Januszewski	218- 863-5910
Perham Perham, MN 56573 Arnold Rethemeier George Thomas	218- 346-6500 Ext. 26
Peterson Peterson, MN 55962 Dick Leibbrand	507- 875-2238
Pierz Pierz, MN 56364 John Blissenbach Dale Vacenik # Ben Jorgensen	612- 468-6458 Ext. 34

School and Instructors	School Number
Pine City	612-
Pine City, MN 55063	629-2576
David Trampe	629-7511
Pine City AVTI	612-
1100 - 4th St.	629-6764
Pine City, MN 55063	629-6986
Michael Stephan	
#x Arvid Anderson	
Roger Thompson	
Pine Island	507-
Pine Island, MN 56164	356-8326
Dan Hoffman	
Pipestone	507-
Pine Island, MN 55963	825-5424
Brad Augustin	825-4171
(also at Jasper)	
# Heimer Swanson	
Marlin Berg	
Pipestone AVTI	507-
North Hiaawatha	825-5471
Pipestone, MN 56146	
Dwayne Eisfeld	
# Michael Caskey	
# Larry Miller	
Denis Parsley	
Plainview	507-
Plainview, MN 55964	534-3128
Tom Anderson	
Preston-Fountain	507-
Preston, MN 55965	765-2342
Morris H. Titrud	
x Kenneth Byrne	
Princeton	612-
Princeton, MN 55371	389-4100
Charles R. Davis	Ext. 64
Don Gylling	
# Westly Wankel	
Randolph	507-
Box 38	645-4773
Randolph, MN 55065	
Edward Terry	

School and Instructors	School Number
Red Wing Central	612-
Red Wing, MN 55066	388-7144
Steve Nelson	388-7181
	388-8271
Red Wing AVTI	612-
Highway 58 at Pioneer Rd.	388-8271
Red Wing, MN 55066	
Romeo Cyr	
# James W. Kelm	
John Wachholz	
x# Jim Morrison	
Redwood Falls	507-
Redwood Falls, MN 56283	637-3511
Ben Broberg	Ext. 10
Renville-Sacred Heart	612-
Renville, MN 56284	329-8368
Loyal Fisher	329-8360
Rochester (John Marshall)	507-
Rochester, MN 55901	285-8693
Luverne Bishlack	285-8645
Rochester AVTI	507-
1926 S.E. 2nd St.	285-8645
Rochester, MN 55901	Ext. 338
Francis Passe	
# Frank Quam	
Roseau	218-
Roseau, MN 56751	463-1471
1/2# Duane Jaenicke	
Round Lake	507-
Round Lake, MN 56167	945-8124
Dennis Dingel (also at Sioux Valley)	
Royalton	612-
Royalton, MN 56373	584-5531
Willard (Randy) Voyles	
Rush City	612-
Rush City, MN 55069	358-4795
Brent Harcey	
Rushford	507-
Rushford, MN 55971	864-7786
Tony Bowers	

School and Instructors	School Number
St. Charles St. Charles, MN 55972 Harry Peirce	507- 932-4421
St. Cloud (Apollo H.S.) St. Cloud, MN 56301 Robert Underwood	612- 253-1600
St. Cloud AVTI 1540 Northway Dr. St. Cloud, MN 56301 Ronald Novotny Howard Pennertz # Raymond Anderson # Dennis Lehto	612- 252-0101 Ext. 42
St. Cloud Technical Sr. St. Cloud, MN 56301 Robert Underwood	612- 252-2231 Ext. 204
St. Francis St. Francis, MN 55070 David Lundquist	612- 753-2550 or 1057
St. James St. James, MN 56081 Dale Busch # Richard Hemmingsen	507- 375-3382
St. Peter St. Peter, MN 56082 John M. Perrizo	507- 931-4210 Ext. 31
Sauk Centre Sauk Centre, MN 56378 Thomas Fenlason	612- 352-2258 Ext. 20
Sauk Rapids Sauk Rapids, MN 56379 Eugene Pulles	612- 253-4700 Ext. 45
Sebeka Sebeka, MN 56477 Del Harrington x Clifton Gustafson	218- 837-5101 837-5104
Sherburn Sherburn, MN 56171 Robert D. Roesler	507- 764-4671 764-4661
Silver Lake Silver Lake, MN 55381 Erling Rongli	612- 327-2117
Sioux Valley R.R. 2 Lake Park, IA 51347 Dennis Dingle (also at Round Lake)	507- 839-3811
Slayton Slayton, MN 56172 Jeff Reeder # George Crompton	507- 836-6184 836-6375
Sleepy Eye Sleepy Eye, MN 56085 Larry Baumgardt	507- 794-7904
Southland Adams, MN 55909 LeRoy F. Swanson Dale Drees # Dwain Vangsness # Gary Thome	507- 582-3568
Springfield Springfield, MN 56087 Rod Larsen 1/2# John Woodford	507- 723-4283 723-6161
Spring Grove Spring Grove, MN 55974 Brad Harguth x Boyde S. Anderson	507- 498-3221 498-3222
Spring Valley Spring Valley, MN 55975 William E. Johnson Lyman Richter # James Erredge	507- 346-7389
Staples Staples, MN 56479 Alois J. Lauer	218- 894-2430 Ext. 366

School and Instructors	School Number
Staples AVTI Irrigation Center Staples, MN 56479 + William E. Guelker # Lennen Naley (Woodland Coop Center) DelRay Lecy Dale Sanderson Ken Broeker	218- 894-2430 Ext. 670 Ext. 158 Ext. 676 Ext. 671 Ext. 583
Stewartville Strewartville, MN 55976 Art Vanderwaal	507- 533-4261
Stillwater 523 W. Marsh St. Stillwater, MN 55082 Ray Erwin Bill Henry	612- 439-3694 Ext. 58
Storden-Jeffers Jeffers, MN 56145 Gerald Dammann	507- 628-5521
Suburban Hennepin County AVTI North Campus 9000 N. 77th Avenue Brooklyn Park, MN 55455 Greg Meunier Ron Boulton Terry Picha Ted Harris	612- 425-3800
Suburban Hennepin County AVTI South Campus 9200 Flying Cloud Drive Eden Prairie, MN 55343 John Turrittin Dale Froyum Patty Ligman Mel Knapton	612- 944-2222 Ext. 245 or 248
Suburban Hennepin Vocational Center 1820 N. Xenium Lane Minneapolis, MN 55441 # Ralph Groschen	612- 559-3535 Ext. 66
Thief River Falls (Lincoln) Thief River Falls, MN 56701 Dannie Packard	218- 681-2700
Thief River Falls AVTI Highway 1 East Thief River Falls, MN 56701 + C.E. Sisler Alan Dalen # Vern Spengler # Donald Johnsen	218- 681-5424
Toivola-Meadowlands Meadowlands, MN 55765 Mathew Takala	218- 427-2311
Tracy Tracy, MN 56175 Jere Rambow	507- 629-4222 Ext. 4
Trimont Trimont, MN 56176 Lee Todnem	507- 639-2[illegible]91
Truman Truman, MN 56088 # Al Brudelie Scott Stuckey	507- 776-2111 776-2377
Twin Valley Twin Valley, MN 56584 Kenneth D. Skauge	218- 584-5151
Highland Vo Center 237 Willow Street Tyler, MN 56178 #x Paul Bartz	507- 247-5528
Ulen-Hitterdahl Ulen, MN 56585 Richard P. Olson # Mike Lockhart	218- 596-8854
Underwood Underwood, MN 56586 Wallace R. Fegert	218- 826-6656
Upsala Upsala, MN 56384 Dellan Pepple	612- 573-2176

School and Instructors	School Number
Verndale Verndale, MN 56481 Richard Muckala (also at Wadena)	218- 445-5184
Wabasha Wabasha, MN 55981 John Graupner	612- 565-4537
Wabasso Wabasso, MN 56293 Brian Hanson # Adrian Vandercrommet	507- 342-5114 342-5118
Waconia Waconia, MN 55387 Dennis Bjorklund (also at Chaska-Scott Center)	612- 442-4431
Wadena Wadena, MN 56482 Richard Muckala (also at Verndale) # Jay Bobb (also at Verndale)	218- 631-3530 Ext. 127
Waldorf-Pemberton Waldorf, MN 56091 Dennis Rossell	507- 23[illegible]-2176
Walnut Grove Walnut Grove, MN 56180 Dale Trulock (also at Milroy)	507- 859-2141
Wanamingo Wanamingo, MN 55983 Ray Ades	507- 824-2211 Ext. 9
Waseca Waseca, MN 56093 J[illegible]rgen Peters # Norman Bohmbach	507- 835-5470
Watertown-Mayer Watertown, MN 55388 Vernon Richter # Vernon Yetzer	612- 955-1934 Ext. 9

School and Instructors	School Number
Waterville-Elysian Waterville, MN 56096 Rick Kvasnicka	507- 362-4431
Wells-Easton 240 - 2nd Avenue S.W. Wells, MN 56097 Dan Johnson	507- 553-5819 553-3001
Westbrook Westbrook, MN 56183 Adam Rachuy	507- 274-6111
West Concord West Concord, MN 55985 Harold W. Long	507- 527-2212
Willmar 824 W. 7th Street Willmar, MN 56201 Raymond Hillstrom Douglas Hanson Dave Damhof	612- 235-4411 235-0338
Willmar AVTI Box 1097 Willmar, MN 56201 + John Thell x Floyd V. Boeder David Shodean Swede Johnson William Ruf Don Brandt Richard Allen Bruce Holmberg Brant Groen Glen Arfstrom Charles Stranberg # Dale Steussy Dennis Goehring Maureen Holmberg Kim Lippert Kent Skoglund Joe Krick	612- 235-5114 Ext. 176

School and Instructors	School Number
Willow River	218-
Willow River, MN 55795	372-3131
# Darrel Ober	372-3168
(also at Barnum)	
Windom	507-
Windom, MN 56101	831-4881
Gene Frederickson	Ext. 58
Winnebago	507-
Winnebago, MN 56098	893-3176
Dale Ripley	Ext. 3
(also see Delavan)	
Winona	507-
901 Gilmore Avenue	454-4630
Winona, MN 55987	Ext. 256
Brian Sather	
Diane Radatz	
Winona AVTI	507-
1250 Homer Road	454-4600
Winona, MN 55987	
David Schroeder	
Andy Marthaler	
Winthrop	507-
Winthrop, MN 55396	647-5382
Steve Zenk (also at Gibbon)	
# Jim Atchison	
Wood Lake	507-
Wood Lake, MN 56297	485-3116
Darrell Willson	
Woodbury	612-
2665 Woodland Drive	459-5571
Woodbury, MN 55016	
Susan Bonestroo	
Woodland Coop Center	218-
Clarissa, MN 56440	756-2102
# Robert Anderson	
# Len Naley	894-2430
	Ext. 676
(mailing address - See Staples AVTI)	
Worthington	507-
Worthington, MN 56187	376-6121
John Wright	Ext. 36
# Wayne Flynn	Ext. 47
1/2x Rolf Mahlberg	
Zumbrota	507-
Zumbrota, MN 55992	732-5820
Eugene Hundeby	

# Adult Instructor
x Instructor for Veterans
+ Agriculture Area Coordinators

RESOURCE CONSERVATION AND DEVELOPMENT OFFICES

Hiawatha Valley
Resource Conservation and Development Offices
Room 202
1610 - 14th Street Northwest
Rochester, Minnesota 55901
(507) 289-7454

WesMin Resource Conservation and Development Offices
700 Cedar Street
Alexandria, Minnesota 56308
(612) 763-4733

Onanegozie Resource Conservation and Development Offices
Room 113
Federal Building
515 West First Street
Duluth, Minnesota 55802
(218) 727-6692 ext. 309

Headwater Resource Conservation and Development Offices
216 Pennington Avenue South
Thief River Falls, Minnesota 56701
(218) 681-6600

REGIONAL SOIL AND WATER CONSERVATION OFFICES

Richard A. Ness, Board Representative Northwest Administrative Region 1705 Highway 2, West, Room 20 Bemidji, MN 56601	218-755-3963 110-3963 Region I
Harold Anderson, Board Representative West Central Administrative Region Regional Development Commission 611 Iowa Avenue Staples, MN 56479	218-894-1692 Region II
Chris Hofstede, Board Representative Northeast Administrative Region Duluth Services Center 320 West 2nd Street, Room 603 Duluth, MN 55808	218-723-4752 101-4690 Region III
Jim Birkholz, Board Representative East Central Administrative Region 90 West Plato Boulevard St. Paul, MN 55107	612-296-3767 Region IV
Ron Shelito, Board Representative Southwest Administrative Region Box 111, 1400 East Lyon Street Marshall, MN 56258	507-537-7260 105-7260 Region V
Jeffrey Nielsen, Board Representative South Central Administrative Region 227 North Minnesota Street New Ulm, MN 56073	507-354-2196 172-232 Region VI
Dave Peterson, Board Representative Southeast Administrative Region Room 135, Friedell Building 1200 South Broadway Rochester, MN 55901	507-285-7458 103-7458 Region VII
Ron Nargang, State Director State Office Room 316 90 West Plato Boulevard St. Paul, MN 55107	612-296-3767

SOIL CONSERVATION SERVICE by Counties
(United States Department of Agriculture)

Aitkin (218) 927-2413
Route 4, Box 48
Aitkin 56431

Anoka (612) 757-4221
550 Bunker Lake Boulevard
Anoka 55303

Becker (218) 847-2651
1000-8th Street S.E.
Detroit Lakes 56501

Beltrami (218) 751-3036
411 Federal Bldg.
Bemidji 56601

Benton (612) 968-7293
Rural Route 2, Box 259
Foley 56329

Big Stone (612) 839-6151
342 N.W. 2nd Street
Ortonville 56278

Blue Earth (507) 345-7418
410 S. 5th Street
Post Office Box 8608
Mankato 56001

Brown (507) 794-4491
108 E. Main St.
Box 497
Sleepy Eye 56085

Burns-Homer-Pleasant (507) 523-2171
Post Office Box 38
560 Debra Drive
Lewiston 55952

Carlton (218) 389-6250
119 Front Street
Post Office Box 318
Barnum 55707

Carver (612) 442-2614
County Office Building
233 South Olive Street
Waconia 55387

Cass (218) 547-1524
100 South 6th Street
Post Office Box 89

Chippewa (612) 269-9453
Courthouse
Montevideo 56265

Chisago (612) 674-7160
Rural Route 3
Post Office Box 1021 B
734 Main Street
North Branch 55056

Clay (218) 233-1361
2223 E. Highway 10
Moorhead 56560

Clearwater (218) 694-6845
Rural Route 1
Post Office Box A
Bagley 56621

Cook (218) 727-6692, Ext. 209
FTS 8-8-783-9209
2812 Miller Trunk Highway
Duluth 55811

Cottonwood (507) 831-1550
Route 2, Box 123
Agriculture Service Center
Windom 56101

Crow Wing (218) 829-3272
512 C Northeast Street
Brainerd 56401

Dakota (612) 463-8626
821 Third Street
Farmington 55024

Dodge (507) 374-6430
Post Office Box 488
42 East Main Street
Dodge Center 55927

Douglas (612) 762-0207
807 Highway 29 North
Alexandria 56308

East Agassiz (218) 584-5168
100 Main Avenue East
Post Office Box 75
Twin Valley 56584

Faribault (507) 526-2400
213 South Main
Blue Earth 56013

Fillmore (507) 765-3878
Rural Route 2, Box 61
Preston 55965

Freeborn (507) 373-5607
1400 West Main Street
Albert Lea 56007

Goodhue (507) 732-5977
Rural Route 1, Box 40F
Zumbrota 55992

Grant (218) 685-4117
Post Office Box 3056
17 Division Street East
Elbow Lake 56531

Hennepin (612) 473-0249
250 North Central Avenue
Wayzata 55391

Hubbard (218) 732-9723
Courthouse Building
Park Rapids 56470

Isanti (612) 689-3353
Eastside Office Building
Route 5, Box 18
Cambridge 55008

Jackson (507) 662-5204
Route 2, Box 9
Lakefield 56150

Kanabec (612) 679-3781
214 Northwest Railroad Avenue
Mora 55051

Kandiyohi (612) 235-3540
409 Highway 23 Southwest
Rural Route 3
Willmar 56201

Kittson (218) 843-2619
Post Office Box 311, Courthouse
Hallock 56728

Koochiching (218) 326-6595
516-C South Pokegama
Grand Rapids 55744

Lac Qui Parle (612) 598-3822
506 2nd Street
Madison 56256

Lake (218) 727-6692, Ext. 209
FTS 8-8-783-9209
2812 Miller Trunk Highway
Duluth, MN 55811

Lake of the Woods (218) 634-2757
Post Office Box 217
Post Office and Federal Building
3rd Street and Lewis Avenue
Baudette 56623

LeSueur (612) 357-4908
145 E. Minnesota Street
LeCenter 56057

Lincoln (507) 694-1630
Post Office Box 32
406 North Norman Street
Ivanhoe 56142

Lyon (507) 537-1401
USDA Ag. Serv. Ctr.
1400 East Lyon Street
Marshall 56258

Mahnomen (218) 935-2987
Post Office Box 381
Darco Building
Mahnomen 56557

Marshall-Beltrami (218) 294-6144
Post Office Box 16
Main Street
Grygla 56727

Marshall (218) 745-4351
105 South Division Street
Warren 56762

Martin (507) 235-6661
2435 Albion Avenue
Fairmont 56031

McLeod (612) 864-5177
Agri. Service Building
1304 Fir Avenue
Glencoe 55336

Meeker (612) 693-2854
West Highway 12
Litchfield 55355

Mille Lacs (612) 983-2153
635 North Central Avenue
Milaca 56353

Morrison (612) 632-2321
Route 4, Box 14A
County Highway 76
& Riverwood Avenue
Little Falls 56345

Mower (507) 433-8268
101-21st Street Southeast
Austin 55912

Murray (507) 836-8567
2558 Broadway Avenue
Slayton 56172

Nicollet (507) 931-1421
County Courthouse
St. Peter 56082

Nobles (507) 376-6194
Post Office Box 124
Wee Street and North Douglas
Worthington 56187

Olmsted (507) 289-6239
Room 200
1610-14th Street Northwest
Rochester 55901

Otter Tail (218) 346-2050
222-2nd Avenue Southeast
Perham 56573

West Otter Tail (218) 736-3859
210 North Cascade Street
Fergus Falls 56537

Pennington (218) 681-3348
Rural Route 3
1305 Dale Street
Thief River Falls 56701

Pine (612) 384-7431
Post Office Box 276
Hinckley 55037

Pipestone (507) 825-5478
119 - 2nd Avenue Southwest
Municipal Building
Pipestone 56164

East Polk (218) 563-2475
Post Office Box 57
Municipal Building
McIntosh 56556

West Polk (218) 281-1445
107 East 2nd Street
Crookston 56716

Pope (612) 634-5143
106-1st Street Southeast
Glencoe 56334

Ramsey (612) 777-0127
1827 North St. Paul Road
Maplewood 55109

Red Lake (218) 253-2693
Post Office Box 31B
Red Lake Falls 56750

Redwood (507) 637-2427
Post Office Box 69
Post Office Building, Room 211
Redwood Falls 56283

Renville (612) 523-1553
Route 2, Box 70
Olivia 56277

Rice (507) 334-6787
1400 Cannon Circle
Faribault 55021

Rock (507) 283-2369
Post Office Box 302
114 East Lincoln
Luverne 56156

Root River (507) 724-3348
Ag. Service Center, Suite 1
603 North Sprague Street
Caledonia 55921

Roseau (218) 463-1862
109-2nd Avenue Northeast
Roseau 56751

North St. Louis (218) 727-6692, Ext. 209
FTS 8-8-783-9209
2812 Miller Trunk Highway
Duluth 55811

South St. Louis (218) 727-6692, Ext. 209
FTS 8-8-783-9209
2812 Miller Trunk Highway
Duluth 55811

Scott (612) 492-2636
107 Water Street
Jordan 55352

Sherburne (612) 441-1262
661 Main Street
Elk River 55330

Sibley (612) 237-2948
Post Office Box 161
310 Main Street
Gaylord 55334

Stearns (612) 251-7800
FTS 8-8-783-7045
3700 West Division Street
St. Cloud 56301

Steele (507) 451-6730
141 Oakdale
Owatonna 55060

Stevens (612) 589-4884
Route 2, Box D
North Highway 28 and 59
Morris 56267

Swift (612) 842-7061
Post Office Box 156
Highway 12 East
Benson 56215

Todd (612) 732-2900
720 Commerce Road South
Long Prairie 56347

Traverse (612) 563-8550
11 Tenth Street North
Wheaton 56296

Wabasha (612) 565-3531
254 West Main Street
Wabasha 55981

Wadena (218) 631-3195
206-1st Street Southeast
Wadena 56482

Waseca (507) 835-4831
120 Second Avenue Southeast
Waseca 56093

Washington (612) 439-6361
14791-60th Street North
Stillwater 55082

Watonwan (507) 375-4712
714 First Avenue South
St. James, 56081

Wilkin (218) 643-3051
421 Nebraska Avenue
Breckenridge 56520

Winona (507) 523-2171
Post Office Box 38
560 Debra Drive
Lewiston 55952

Wright (612) 682-1933
902 Commercial Drive
Buffalo 55313

Yellow Medicine (612) 669-4442
Post Office Box 545
1000 - 10th Avenue
Clarkfield 56223

SOIL AND WATER CONSERVATION DISTRICTS by Counties

Aitkin (218) 927-2413
Rural Route 4, Box 48
Aitkin 56431

Anoka (612) 757-4221
550 Bunker Lake Boulevard
Anoka 55303

Becker (218) 847-2651
1000-8th Street SE
Detroit Lakes 56501

Beltrami (218) 751-3036
Federal Building
Room 403
Bemidji 56601

Benton (612) 968-7293
Rural Route 2, Box 259
Foley 56329

Big Stone (612) 839-6151
342 N.W. 2nd Street
Ortonville 56278

Blue Earth (507) 345-7418
410 S. 5th Street
Post Office Box 8608
Mankato 56001

Brown (507) 794-4491
108 E. Main Street
Post Office Box 497
Sleepy Eye 56085

Burns-Homer-Pleasant (507) 523-2171
Post Office Box 38
Lewiston 55952

Carlton (218) 389-6250
Post Office Box 318
Barnum 55707

Carver (612) 442-2614
County Office Building
233 South Olive Street
Waconia 55387

Cass (218) 547-1524
100 South 6th Street
Post Office Box 89
Walker 56484

Chippewa (612) 269-9453
Courthouse
Montevideo 56265

Chisago (612) 674-7160
Rural Route 3
Post Office Box 1021B
North Branch 55056

Clay (218) 233-1361
2223 E. Highway 10
Moorhead 56560

Clearwater (218) 694-6845
Post Office Box 327
102 East Seventh Street
Bagley 56621

Cook - Thurs. (218) 387-2282, Ext. 120
M, T, W, F, (218) 387-1437
Box 925
Grand Marais 55604

Cottonwood (507) 831-1550
Route 2, Box 123
Windom 56101

Crow Wing (218) 829-3272
512 C Northeast Street
Brainerd 56401

Dakota (612) 463-8626
821 Third Street
Farmington Professional Building
Farmington 55024

Dodge (507) 374-6430
Post Office Box 488
Dodge Center 55927

Douglas (612) 762-0207
807 Highway 29 North
Alexandria 56308

East Agassiz (218) 584-5169
Post Office Box 75
Twin Valley 56584

Faribault (507) 526-2388
213 South Main
Blue Earth 56013

Fillmore (507) 765-3878
Ag. Service Center
Rural Route 2, Box 61
Preston 55965

Freeborn (507) 373-5607
1400 West Main Street
Albert Lea 56007

Goodhue (507) 732-5977
Rural Route 1, Box 40F
Zumbrota 55992

Grant (218) 685-4117
17 Division Street East
Elbow Lake 56531

Hennepin (612) 473-0249
250 North Central Avenue
Suite 109
Wayzata 55391

Hubbard (218) 732-9723
Courthouse Building
Park Rapids 56470

Isanti (612) 689-3353
Eastside Office Building
Rural Route 5, Box 18
Cambridge 55008

Itasca
516 C Pokegama Avenue South
Grand Rapids 55744

Jackson (507) 662-5204
Route 2, Box 9
Lakefield 56150

Kanabec (612) 679-3781
214 Northwest Railroad Avenue
Mora 55051

Kandiyohi (612) 235-3540
409 Highway 23 Southwest
Rural Route 3
Willmar 56201

Kittson (218) 843-2619
Post Office Box 311
Hallock 56728

Koochiching (218) 326-6595
County Courthouse
International Falls 56649

Lac Qui Parle (612) 598-3822
506 2nd Street
Madison 56256

Lake (218) 834-5212
520 South Avenue
Two Harbors 556166

Lake of the Woods (218) 634-2757
Post Office Box 217
Baudette 56623

LeSueur (612) 357-4908
145 E. Minnesota Street
LeCenter 56057

Lincoln (507) 694-1630
Post Office Box 32
Ivanhoe 56142

Lyon (507) 537-1401
Ag. Serv. Ctr.
1400 East Lyon Street
Marshall 56258

Mahnomen (218) 935-2987
Post Office Box 381
East Monroe Avenue
Mahnomen 56557

Marshall-Beltrami (218) 294-6144
Post Office Box 16
Grygla 56727

Marshall (218) 745-5010
105 South Division Street
Warren 56762

Martin (507) 235-6662
Post Office Box 272
2435 Albion Avenue
Fairmont 56031

McLeod (612) 864-5176
1304 Fir Avenue
Glencoe 55336

Meeker (612) 693-2854
Route 3, Box 3-A
Litchfield 55355

Mille Lacs (612) 983-2154
635 North Central Avenue
Milaca 56353

Morrison (612) 632-2321
Route 4
Little Falls 56345

Mower (507) 433-8268
101-21st Street Southeast
Austin 55912

Murray (507) 836-8568
Ag. Serv. Center
2558 Broadway Avenue
Slayton 56172

Nicollet (507) 931-1421
County Courthouse
St. Peter 56082

Nobles (507) 376-6195
Post Office Box 158
1508 North Douglas
Worthington 56187

Olmsted (507) 289-6239
Room 200
1610-14th Street Northwest
Rochester 55901

East Otter Tail (218) 346-2050
222-2nd Avenue Southeast
Perham 56573

West Otter Tail (218) 736-3859
210 North Cascade Street
Fergus Falls 56537

Pennington (218) 681-3348
1305 Dale Street
Thief River Falls 56701

Pine (612) 384-7431
Post Office Box 276
Hinckley 55037

Pipestone (507) 825-5478
119 - 2nd Avenue Southwest
Pipestone 56164

East Polk (218) 563-2475
Post Office Box 57
McIntosh 56556

West Polk (218) 281-1445
107 East 2nd Street
Crookston 56716

Pope (612) 634-5143
106-1st Street Southeast
Glencoe 56334

Ramsey (612) 777-0127
Town and County Bank Bldg.
1827 North St. Paul Road
Maplewood 55109

Red Lake (218) 253-2593
Rural Route 1
Post Office Box 31-B
Red Lake Falls 56750

Redwood (507) 637-2427
Post Office Box 69
Redwood Falls 56283

Renville (612) 523-1559
Box 70
Olivia 56277

Rice (507) 334-678[illegible]
1400 Cannon Circle
Faribault 55021

Rock (507) 283-2369
Post Office Box 186
110 North Oakley
Luverne 56156

Root River (507) 724-3348
603 North Sprague Street
Suite 1
Caledonia 55921

Roseau (218) 463-1862
109-2nd Avenue Northeast
Roseau 56751

North St. Louis (218) 741-3230
401 Sixth Avenue North
Virginia, MN 55792

South St. Louis (218) 727-6692, Ext. 209
2812 Miller Trunk Highway
Duluth 55811

Scott (612) 492-2636
107 Water Street
Jordan 55352

Sherburne (612) 441-1262
661 Main Street
Elk River 55330

Sibley (612) 237-2948
Post Office Box 161
310 Main Street
Gaylord 55334

Stearns (612) 251-6718
3700 West Division Street
St. Cloud 56301

Steele (507) 451-6730
141 Oakdale
Owatonna 55060

Stevens (612) 589-4884
Rural Route 2, Box D
Morris 56267

Swift (612) 842-7061
Post Office Box 156
Benson 56215

Todd (612) 732-2644
720 Commerce Road South
Long Prairie 56347

Traverse (612) 563-8550
Broadway Office Building
Wheaton 56296

Wabasha (612) 565-3531
254 West Main Street
Wabasha 55981

Wadena (218) 631-3195
206-1st Street Southeast
Wadena 56482

Waseca (507) 835-4831
120 Second Avenue Southeast
Waseca 56093

Washington (612) 439-6361
14791 Sixtieth Street North
Stillwater 55082

Watonwan (507) 375-3191
705 Weston Avenue
St. James 56081

Wilkin (218) 643-3051
421 Nebraska Avenue
Breckenridge 56520

Winona (507) 523-2171
Box 38
Lewiston 55952

Wright (612) 682-1970
902 Commercial Drive
Buffalo 55313

Yellow Medicine (612) 669-4442
Box 545
Clarkfield 56223

UNIVERSITY OF MINNESOTA (Campuses Offering Agricultural Programs)

- St. Paul Campus
- Technical College, Crookston
- Technical College, Waseca

OTHER RESOURCE ORGANIZATIONS

Association of Minnesota Counties
(612) 222-5821

League of Minnesota Cities
(612) 227-5600

Minnesota Association of Townships
(612) 497-2330

Minnesota Alliance for Arts in Education
(612) 376-1197

Minnesota Association for the Education of Young Children
(612) 646-8689

Minnesota Association of School Administrators
(612) 636-5558

Minnesota Catholic Education Association
(612) 227-8777

Minnesota Counties Research Foundation
(612) 224-3344

Minnesota Curriculum Services Center
(612) 770-3943

Minnesota Education Association
(612) 227-9541

Minnesota Elementary School Principals Association
(612) 227-7209

Minnesota Environmental Sciences Foundation
(612) 642-9046

Minnesota Federation of Teachers
(612) 227-8583

National Education Association Regional Office
(612) 227-7894

State Historical Society - Education Programs
(612) 296-6126

USDA Research Leader Soil and Water Management
(612) 373-1444

USDA Agricultural Stabilization and Conservation
(612) 725-7652

USDA Economics and Statistics (Linda Wright)
(612) 296-2230

USDA Forest Experiment Station - St. Paul Campus
(612) 642-5207

Minnesota Association of Farmers, Landowners and Sportsmen
(612) 645-9718

Minnesota Counties Research Foundation
(612) 224-3344

Minnesota Foundation Directory
(612) 542-8582

State Document's Center
(612) 297-3000

Center for Creative Educational Service
(612) 644-6070

AG-STRAVAGANZA MATERIAL

The following materials were produced specifically for this project.

1. The set of materials: a looseleaf notebook divided into seven topic areas, (22 components for grades K-6), a bibliography of resources, both print and audio-visual; a resource guide to local, county, and regional resource people.
2. "Minnesota's Ag-Stravaganza", a video-cassette introducing students to the need to protect and conserve agricultural land.
3. "Land Use: Whose Responsibility?" VHS video-cassette "Land Use," filmstrip for Component 17.
4. Minnesota Maps, 11" x 17" (one per student in grades 5 and 6).

Available from you Regional Soil and Water Conservation Office. See RESOURCE GUIDE, page 48.

COMPUTER DISCS

Title: "Ding" Darling Computer Discs
Publisher/Producer: Iowa 4-H Youth Program
Format: computer discs and notebook.
Content Description: Prepared by the Iowa 4-H and Youth Program Staff, Cooperative Extension Service, Iowa State University, Ames Iowa, through a grant from the J.N. "Ding" Darling Foundation.
Concept: Agricultural Land Preservation.
Price: $40.00
Order From: State 4-H Youth Office
Iowa State University
32 Curtis Hall
Ames, IA 50011

EDUCATIONAL CARTOON BOOKLETS

Order from:

Soil Conservation Society of America 7515 Northeast Ankeny Road Ankeny, IA 50021	May be available locally from Soil Conservation Service. See telephone listing for your county office.

Cost: $.25 each
Teacher's Guide - $.50 each

SCSA's educational cartoon booklets are each 16 pages, printed in full color on newsprint. All were prepared under the supervision of a special committee and convey accurate, factual information about natural resource problems. The vocabulary and comprehension level is aimed at 4th graders and above.

The Idea That Worked: America's Conservation Districts tells the story of soil and water conservation districts; their history, the role they are playing in halting erosion and improving watersheds, their continuing influence on sound land use practices, and their future role in improving water quality, agricultural production, and the wise use of the land.

The Story Of Land describes man's use and misuse of the soil throughout history, emphasizing the soil conservation district approach to solving current problems. It ranks as the number one selling conservation booklet.

Food And The Land tells the story of man's climb from a subsistence society to one in which a single farmer can supply the needs of many and explains the role conservation has in maintaining agricultural production.

Working Together For A Livable Land concentrates on the declining of the environment and shows how citizens can work together as a community to create more desirable working and living conditions.

Plants, Animals, And Man--Sharing The Earth--An Ecology Story
A basic primer on ecology for all children, explaining how soil, water, air, and solar nergy interact to create food. It also outlines needs for conservation, pollution control, and proper planning.

FOREST SERVICE OF THE U.S. DEPARTMENT OF AGRICULTURE

Single copies of any of the following publications may be obtained free from the Forest Service at 633 W. Wisconsin Avenue, Milwaukee, Wisconsin 53203 or 6818 Market Street, Upper Darby, Pennsylvania 19082.

Leaflets and Pamphlets

FS - 1	Ranger 'Rithmetic for First and Second Grade Teachers. A teaching aid illustrating 24 arithmetic problems, all dealing with forest conservation. Helps teachers integrate forestry in first and second grade arithmetic. Each problem is followed by a related forest fact. 12 pages.	
FS - 3	Ranger 'Rithmetic for Third Grade Teachers. Similar to FS - 1 but for grade 3. 12 pages.	
FS - 4	Ranger 'Rithmetic for Fourth Grade Teachers. 12 pages.	
FS - 5	Ranger 'Rithmetic for Fifth Grade Teachers. 12 pages.	
FS - 6	Ranger 'Rithmetic for Sixth Grade Teachers. 12 pages.	
FS - 7	Ranger 'Rithmetic for Seventh Grade Teachers. 12 pages.	
*FS - 11	Conservation Pledge. 2 pages. Text of the pledge, and several ways land users can implement the pledge.	gr. 4-12
*FS - 12	Why Leaves Change Color. 2 pages.	gr. 4-12
*FS - 13	Field Offices, Forest Service, U.S. Department of Agriculture. 4 pages. Includes map showing the National Forests and research stations and their respective headquarters.	gr. 5-12
FS - 59	Conservation Fact Sheet. 2 pages. Includes Conservation Pledge.	gr. 1-12
FS - 18	Forests and Water.	gr. 5-12

Activities for Learning About Conservation of Forest Resources: A Guide for Leaders of Youth Groups.

Charts, Posters, and Maps

*FS - 32	How a Tree Grows. (8 by 10-1/2 inches.)	gr. 5-12
FS - 8	How a Tree Grows. (21 by 24 inches, in color.) 20 cents	gr. 5-12
FS -279	What We Get From Trees. (40 by 28 inches, in color.) 20 cents. The vast number of products are listed under broad categories in a dramatic outline highlighted in four colors.	gr. 5-12

*Useful Trees of the United States, 4 pages. These leaflets, illustrated with photos, sketches, and map of each tree's range, describe some of the important trees and their uses. (Please order only the set for your section of the country.)

Trees of Eastern U.S. (16 species; 13 are also found in the South).	gr. 5-12
Trees of Southern U.S. (16 species, 13 are also found in the East).	gr. 5-12
Trees of Western U.S. (10 species).	gr. 5-12
Bookmarks--Smokey Bear. Heavy paper, fully illustrated.	gr. 1-6
Woodsy Owl, Give a hoot-don't pollute!	gr. 1-6

Audio-Visual Materials

Our National Forests. A sixth-grade forest study unit, with filmstrips, slides, and narration. Tells how National Forests serve America in many ways. For sale only; Filmstrip: $5.00; slide set: $5.50. Order from Office of Information, U.S. Department of Agriculture, Washington, D.C. 20250.

FILMS

University of Minnesota
Audio Visual Library Service
3300 University Avenue, S.E.
Minneapolis, MN 55414 (612) 373-3810

Either: Call in and the University of Minnesota will send a written confirmation, or send in rental form.

Erosion: Leveling The Land $8.35
Color; 14 min; gr. 4-6; 1964. Examines weathering, erosion, deposition. Studies the transference of loosened rock debris from high ground to basin areas, which results in leveling the land. 5G0368

Face Of The Earth $8.35
Color; 12 min; 1940; gr. 4-6. Reveals wearing down forces on earth in the action of glaciers, frost, landslides and running water, and also building up forces of volcanoes. Portrays the Painted Desert, Petrified Forest, Grand, Zion and Bryce Canyons. 5G0370

Lands And Waters Of Our Earth $6.50
B & W; 11 min; K-6; 1956. Jimmy observes hills, mountains, valleys, rivers and relationships among them. 2G0560

Life In A Cubic Foot Of Soil $4.50
B & W; 11 min; 1963; gr. 4-6. Examines plant and animal life in a cubic foot of soil. Shows nitrogen-fixing bacteria, blue-green algae, molds and inorganic components of soil. Soil is important to our life on earth. 2N0407

Soil: An Introduction $7.85
Color; 9 min; K-6; 1976. Without soil, life would not be possible. Soil needs to be renewed so it can hold water and air. 3G0878

Understanding Our Earth: Soil $4.50
B & W; 10 min; 1953; gr. 4-6. Explains soil profile (topsoil, subsoil, loose rock and bed rock), elements of soil, processes of soil making, types of soil throughout the U.S., and the importance of conservation. 2G0409

Your Friend The Soil: Keep It Or Lose It $5.00
Color; 11 min; 1954; gr. 1-6. Shows that good soil and good food are a part of each child's share of our national heritage. 3Z0047

Todd: Growing Up In Appalachia; 16mm film: 12 minutes, 1970, grades 3-junior high. Describes the moral dilemma of an Appalachian boy when he finds a purse full of food stamps. Heightens children's awareness of how other people live. 5S1367

* * * * * * * * * * *

Hunger Action Coalition/Minnesota
Room 326 East, 310 East 38th Street
Minneapolis, MN 55409
(612) 823-7611

Charlie Cheddar's Choice; Filmstrip and cassette: 13 minutes, 1976. K-5. A well-off mouse becomes aware of world hunger and finds ways that he can help.

****

North Dakota State Film Library
Box 5036, State University Station
Fargo, North Dakota 58105-5036
(701) 237-8907

Either: Call directly--will confirm immediately, or send in the enclosed film rental form

Erosion: Leveling The Land $5.00
Color; 14 min; gr. 4-6; 1965. Examines weathering, erosion, deposition. Studies the transference of loosened rock debris from high ground to basin areas, which results in leveling the land.

Erosion And Weathering: Looking At The Land $5.75
Color; 17 min; gr. 4-6; 1977. Explores effects of running water, wind erosion of plowed fields, beaches and deserts and how gravity causes erosion through landslides.

Face Of The Earth $4.00
Color; 12 min; 1954; gr. 4-6. Reveals wearing down forces on earth in the actions of glaciers, frost, landslides and running water, and also building up forces of volcanoes. Portrays the Painted Desert, Petrified Forest, Grand, Zion and Bryce Canyons.

Land Use And Misuse $5.25
Color; 13 min; 1971; gr. 6. Urban development, deforestation, industrial and agricultural malpractice can create wastelands of erosion resulting in loss of water, crops and wildlife.

Topsoil $4.75
B & W; 10 min; gr. 4-6. Shows how topsoil, which required centuries to make, can be destroyed in minutes.

Trees And Their Importance $3.50
Color; 12 min; gr. 4-6; 1966. Emphasizes the role of trees in water and soil conservation. Animated sequences show the life processes of a tree.

Understanding Our Earth: Soil $3.50
Color; 11 min; gr. 4-6; 1977. Tells about the Soil--what it is, where it comes from and its importance to conservation.

* * * * * * * * * * *

University of Wisconsin-LaCrosse
Film Library, A-V Center
LaCrosse, Wisconsin 54601
(608) 785-8000

Either: Call directly, or fill in film request form

* * * * * * * * * * *

Soil Makers: Decomposition By Simple Plants And Insects $7.20
Color; 16 min; gr. 4-6; 1966. Discusses value of topsoil and complex process by which it is formed. Discusses results of man's encroachment of nature. 4B462

Everything In Its Place, 16 mm, color; 33 min.
Grade Level: 6
Cost: free

Forestland, wildlife refuge areas, farmland, grasslands--all are needed for a balance in nature. Excellent narration and pictures.

Order from:

ECSU SW & WC
Media Services
301 North 1st Street
Montevideo, MN 56265
(available only to members)

ECSU
Pierce Building
No. Mankato, MN 56001
(available only to members)

SMECSU
5930 Bandel Road, N.W.
Rochester, MN 55901
(available only to members)

S.W. Film Co-op
401 College Ave.
Fulda, MN 56131
(available only to members)

Library Media Circuit
301 Hanover Building 301 North
480 Cedar Street
St. Paul, MN 55101
(612) 296-2821

DNR
Film Loan Service
Bureau of I & E
350 Centennial Bldg.
St. Paul, MN 55155
(612) 296-3336

Jack Jones
REEC
R.R. 7, Box 376
Mankato, MN 56001

MN Valley Regional Library
100 E. Main Street
Mankato, MN 56001
(507) 387-1856

* * * * * * * * * * *

Grange Farm Foundation
616 H. Street N.W.
Washington, D.C. 20006

Free films; only cost is return postage

Footprints In The Soil; color; 30 min.
Grade level: 6

This review of recent scientific research brings both farmers and non-farmers up to date in plant and animal studies designed to feed and clothe a growing world population.

Generations Of The Land; color, 27 min.
Grade level: 6

Describes the challenges facing our family farms which are the basis for our plentiful food and fiber production.

No Tillage: A Farming System; color; 16 min.
Grade level: 6

No till farming isn't a trend. Harry Young has been using the system for over 20 years.

* * * * * * * * * * *

The Price Of Abundance; color; 29 min.
Grade level: 6

This film focuses on a midwest family who is aware of the economic pressures that modern farming has produced. The reflections of this family are highlighted in the film, which is interspersed with comments from agricultural economists, scientists and consumer representatives.

Order from:

Shawnee Resource Conservation and Development Area
1305 North Yale Avenue
Rural Route 6, Box 255
Marion, IL 62959
(618) 997-4415

* * * * * * * * * * *

On American Soil, 1983
Cost: Rental $40.00 per showing. Purchase $450.00.
Nontechnical film for lay audience; discusses nature and extent of soil erosion in America today.

Order from:

The Conservation Foundation
1717 Massachusetts Avenue. N.W.
Washington, D.C. 20036

* * * * * * * * * * *

MAGAZINES AND BOOKS

Country Kids
Grade level: K-6
Cost: $ 3.95 per issue
$13.95 per year (published bimonthly)

This publication educates and entertains its readers through farm-orientated articles, puzzles, games, crafts, quizzes and contests.

Order from:

Country Kids
P.O. Box 572
Milwaukee, Wisconsin 53201

Title: All About Illinois Farms. A Color and Fun Book
Publisher/Producer: Illinois Farm Bureay
Grade Level: 1-4
Format: Color and fun book
Content Description: Contains pictures and games about agriculture.
Concept: Agriculture Education
Order From: Illinois Farm Bureau
Illinois Agricultural Association
Post Office Box 2901
1701 Towanda Avenue
Bloomington, IL

Title: A Journey with a Raindrop Through a Small Watershed
Publisher/Producer: Sharon Bunch
Format: Book
Content Description: Traces the journey of a raindrop. Simple format.
Order From: The Virginia Association of Soil and Water Conservation Districts, Richmond, Virginia.

Title: Farm Coloring Book
Publisher/Producer: National Agri-Marketing Association
Format: Coloring book
Content Description: Describes how almost everything starts on a farm; provides understanding of the relationship between farmers and you. K-3
Order From: National Agri-Marketing Association
Ames, Iowa

Title: Food First Comics
Publisher/Producer: Institute for Food and Development Policy
Format: Comic book
Content Description: To promote the understanding that hungry people's lack of food is a symptom of their lack of rights to land, jobs, and food, Appropriate for grade 6.
Price: $1.00
Order From: Institute for Food and Development Policy
1885 Mission Street
San Francisco, CA 94103
(415) 864-8555

Title: Farming's Fantastic Facts
Author: Rena Buck Will
Format: Book
Content Description: Written for grade school children; tells about agriculture, its importance, and its way of life.
Price: $4.75 each
Order From:

Rena Buck Will
Route 1, Box 259-A
Amity, OR 97101

Women for Agriculture
Post Office Box 101
Dayton, OR 97114

Title: Farmland Crossword Puzzles
Publisher: Western Publishing Co., Inc.
Format: Book
Content Description: Crossword puzzles about farm-related terms. A challenging way to develop skills in reading, spelling, comprehension, and vocabulary building.
Price: $ .79 each.
Order From: Western Publishing Co., Inc.
Racine, WI

Title: Happiness is a Cow
Format: Colorbook
Content Description: A colorbook for K-2
Price: $.50 each
Order From: S.A. Domeier
Rural Route 2, Box 77
New Ulm, MN 56073

MODEL FARM SITES

Farmamerica
Post Office Box Box 11
Waseca, MN 56093
(507) 835-2052

Farmamerica is Minnesota's Agricultural Interpretive Center - an indoor/outdoor living history center depicting the wide range of agriculture. School children will be able to see their textbooks "come alive" as they observe, first-hand, the processes of food production and experience agriculture's past development and future in authentic settings. Farmamerica will portray the history of agriculture through model working farms depicting different eras of farming: The Pioneer Farm (1850-60's), The Horse/Steam Farm (1870-1900's), The Early Mechanized Farm (1930's) and The Modern Farm (present). There will be an admission charge.

Gibbs Farm Museum
2097 Larpenteur Avenue
Falcon Heights, MN 55113
(612) 646-8629

Gibbs Farm Museum offers school children a tour of the site, including: a farmhouse, schoolhouse, a barn with agricultural equipment, and a barn with farm animals the children can pet.

Southeastern Minnesota Forest
Resource Center
Route #2, Box 156A
Lanesboro, MN 55949
(507) 467-2437

The Forest Resource Center offers many services for people of all ages including quality educational programs for elementary students and demonstration areas which depict woodland management techniques.

Wilder Forest Farm
14189 Ostland Trail North
Marine-on-St. Croix, MN 55047
(612) 433-5198

The 80 acre Farm serves as an outdoor laboratory for people interested in experiencing the production of the food and fiber. School groups are invited to visit the Farm for explorations of rural life and work.

OTHER CURRICULUM PACKETS

Title: Food for America - FFA Tells the Story
Publisher/Producer: National FFA Foundation
Grade Level: K-3 and 3-5
Format: 2 booklets
Content Description: Contains activity sheets and dittos that introduces the business of agriculture to elementary students.
Concept: Agriculture Education
Price: $3.25
Order From: Future Farmers of America
P.O. Box 14325
Dayton, Ohio 45414

Title: The Great American Farm
Publisher/Producer: U.S. Department of Agriculture
Grade Level: 4, 5, and 6
Format: Packet
Content Description: Contains colorful, informative wall chart and activity program to help students learn more about agricultural production and costs.
Concept: Agriculture Education
Order From: U.S. Department of Agriculture
Washington, D.C. 20250

Title: A Pilot Educational Project for Minnesota Schools
Publisher/Producer: Minnesota Women for Agriculture, Inc., and Minnesota Agriculture Statistics Service
Grade Level: 4 and 5
Format: Folder
Content Description: Contains an educational project designed to teach children in grades 4 and 5 about Minnesota agriculture.
Concept: Agriculture Education
Order From: AGRI-SCHOOL
Post Office Box 70068
St. Paul, MN 55107

Title: "Teacher's Guide to Conservation Education", People and Their Environment Services (8 Vols.), "Outdoor Laboratory"
Publisher/Producer: J.G. Ferguson
Grade Level: 4, 5, 6 - grades 1-12
Format: Book
Content Description: Contains a curriculum guide for teaching conservation with a special focus on how man is dependent on his environment. 1969.
Concept: Conservation Education
Order From: South Carolina Conservation Curriculum Improvement Project - South Carolina Department of Education

Title: A Teacher's Resource Guide for Nebraska Agriculture
Publisher/Producer: Nebraska Department of Agriculture and Department of Education
Grade Level: 1st booklet, K-3, 2nd booklet, 4-6
Format: 2 booklets
Content Description: Contains listing of Agriculture Education material on Agriculture products and also resource contacts that are in Nebraska and out of Nebraska.
Concept: Agriculture Education Resources
Order From: The Nebraska Department of Agriculture
Agriculture Development
301 Centennial Mall South, P.O. Box 94947
Lincoln, Nebraska 68509
Phone: 402-471-2341

Title: Teacher's Curriculum Guide to Conservation Education
Publisher/Producer: J.G. Ferguson Publishing Co.
Grade Level: 1-12
Format: Book, 142 pages. 1969.
Content Description: Contains a guide of suggestions for teachers to teach conservation.
Concept: Conservation Education
Order From: Department of Education, State of South Carolina

Title: Conservation Education
Price: $4.00
Order From: Colorado Department of Education's Conservation Education Services and Project ACCESS

Title: Colorado Model for Conservation Education Concepts
Publisher/Producer: Colorado Department of Education
Grade Level: K-13
Format: 44 page book
Content Description: Contains suggestions and teaching aids for teachers to teach conservation.
Concept: Conservation Education
Order From: Colorado Department of Education

Title: Food, Energy and You
Publisher/Producer: National Food and Energy Council
Format: Booklet
Content Description: Emphasizes the importance of agriculture and its need for timely energy supplies.
Concept: Agriculture Education
Order From: National Food and Energy Council
409 Vandiver West - Suite 202
Columbia, MO 65202
(312) 875-7155

Title: Measuring the Steepness of Land (No. 2), Determining Soil Texture (No. 3), The Coveat Rainfall Runoff Race (No. 4), Exploring the Soil (No. 8), Studying Soil Erosion and It's Control (No. 10), Studying Soil Texture and Its Influence (No. 12).
Publisher/Producer: Clifton Halsey, Agricultural Extension Service.
Format: Activity sheets
Concept: Soil
Price: $.20 per Activity Sheet
Order From: Agricultural Extension Service, 3 Coffey Hall, University of Minnesota, 1420 Eckles Avenue, St. Paul, MN 55108.

Title: Whirligigs
Publisher/Producer: U.S. Fish and Wildlife Service
Format: Packet
Content Description: A sequence of activities that relate water quality, land use, and fish populations.
Concept: Environmental Education
Order From: U.S. Fish and Wildlife Service
Federal Building
Fort Snelling
Twin Cities, MN 55111

Title: Minnesota Natural Resources
Publisher/Producer: Agricultural Extension Service - University of Minnesota
Format: Elementary teaching guide - book
Content Description: To provide background information for students participating in outdoor conservation classes.
Concept: Environmental education
Order From: Agricultural Extension Service
University of Minnesota
St. Paul, MN 55108

Title: Conservation Tools for Educators
Publisher/Producer: U.S. Department of Agriculture - Forest Service
Format: Booklet
Content Description: Contains a few tools to help the teacher put conservation into the classroom. K-12
Concept: Conservation education
Order From: Conservation Education Officer
U.S. Forest Service
Post Office Box 3623
Portland, OR 97208

Title: Learning to Live
Publisher/Producer: Minnesota Department of Natural Resources
Bureau of Information and Education
Format: Booklet
Content Description: A manual of environmental education activities.
Concept: Environmental education
Order From: Minnesota Department of Natural Resources
Centennial Building
658 Cedar Street
St. Paul, MN 55155

Title: Southeastern Minnesota Forest Resource Center
Publisher/Producer: Southeastern Minnesota Forest Resource Center
Format: Field trips before/after activity sheets.
Content Description: Educational/demonstration programs will increase awareness, and the level of knowledge of forests. K-6
Concept: Forestry education
Order From: Southeastern Minnesota Forest Resource Center
Route #2, Box 156 A
Lanesboro, MN 55949
(507) 467-2437

Title: Soil Activities
Publisher/Producer: Iowa 4-H and Youth Programs and J.N. "Ding" Darling Foundation.
Format: Packet
Content Description: Ten activities dealing with the soil. Grades 4-6.
Concept: Soil Conservation
Order From: Iowa Cooperative Extension Service
Iowa State University
Ames, IA

Title: Food First Curriculum
Publisher/Producer: Institute for Food and Development Policy
Content Description: An integrated curriculum to help grade 6 students learn the paths of the food they eat, the roots of hunger here and abroad, and how they can act locally on a global problem; with modifications for grades 4-5 and 7-8.
Price: $12.00
Order From: Food First
Institute for Food and Development Policy
1885 Mission Street
San Francisco, CA 94103

Title: People on the Farm
Publisher/Producer: U.S. Department of Agriculture
Format: 9 booklets
Content Description: Complete guide for teachers to help students understand the nature of modern agriculture, how their food is produced and the interdependence between farms and consumers.
Concept: Agriculture Education
Price: Filmstrips - $20.50, Slide Set - $29.50
Order From: Photo Lab, Inc. - Photography Division, GPA
3825 Georgia Avenue Northwest - U.S.D.A.
Washington, D.C. 20011 - Washington, D.C. 20250

Title: Web of Life Homestead. An Environmental Education Resources Packet.
Publisher/Producer: Council on Quality Education, Division of Planning and Development, Minnesota Department of Education
Grade Level: K-12
Format: Packet
Content Description: Describes the Web of Life Homestead in Watertown that was built by students.
Concept: Experimental Education
Order From: Scott Creeger, Project Director
Watertown Public Schools
Watertown, MN 55388

Title: Energy, Environmental and Outdoor Education Activities
Publisher/Producer: Minnesota Department of Education
Format: Folder
Content Description: Contains energy activities that relate to environmental/outdoor application for both inside and outside of the classroom.
Concept: Environmental Education
Order From: Minnesota Department of Education

REFERENCES FOR TEACHERS

Title: Guide to Environmental Education Resources in the Twin Cities.
Publisher/Producer: Debby Filker and Clifton Halsey, Agriculture Extension Service, University of Minnesota.
Format: 28 page booklet.
Content Description: Contains a breakdown of environment subject matter and places to find information on that subject. An excellent guide.
Concept: Environmental Education
Order From: Agricultural Extension Service
University of Minnesota
St. Paul, MN 55108

Title: Assistance Available From the Soil Conservation Service.
Publisher/Producer: U.S. Department of Agriculture, Soil Conservation Service.
Format: Booklet, 29 pages.
Content Description: Describes the Soil Conservation Service and the programs that it offers. 1980.
Concept: SCS information
Order From: Information Division
Soil Conservation Service
U.S. Department of Agriculture
Post Office Box 2890
Washington, D.C. 20013

Title: Teaching Soil and Water Conservation - Classroom and Field Guide.
Publisher/Producer: SCS
Format: Pamphlet
Content Description: Contains conservation activities given in two parts: A how to-do-it part and an interpretation part. 1977.
Concept: Conservation Education
Order From: Soil Conservation Service
U.S. Department of Agriculture

Title: America's Soil and Water: Condition and Trends
Publisher/Producer: Soil Conservation Service, U.S. Department of Agriculture
Format: Booklet, 32 pages
Content Description: Contains graphs, charts and maps of present trends in soil and water conditions in America. 1981.
Concept: Soil and water trends
Order From: U.S. Department of Agriculture

Title: Minnesota Poverty - The Face of Poverty
Publisher/Producer: Minnesota Department of Economic Security and Association of Minnesota counties.
Format: Monograph
Content Description: Discusses the changing face of poverty across Minnesota. Includes who is poor in Minnesota, household poverty, minority poor, census definitions.
Order From: Minnesota Department of Economic Security
Office of Economic Opportunity
690 American Center Building
St. Paul, MN 55101
(612) 296-4657

Title: Minnesota Poverty - The Poor and The Economy
Publisher/Producer: Minnesota Department of Economic Security and Association of Minnesota Counties.
Format: Monograph
Content Description: Includes "the working poor", the "deserving poor", the "chronic poor", "temporary poor", communities and the poor.
Order From: Minnesota Department of Economic Security
Office of Economic Opportunity
690 American Center Building
St. Paul, MN 55101
(612) 296-4657

Title: Diet for a Small Planet
Author: Frances Moore Lappe'
Format: Paperback book
Content Description: Offers an all new philosophy on changing yourself - and the world - by changing the way you eat.
Price: $3.50
Order From: Institute for Food and Development Policy
1885 Mission Street
San Francisco, CA 94103
(415) 864-8555

Title: Trading the Future
Author: James Wessel with Mort Hantman
Format: Paperback book
Content Description: Demonstrates that the ground rules of our economy have led farmers to record harvests coupled with record farm bankruptcies.
Price: $8.95
Order From: Institute for Food and Development Policy
1885 Mission Street
San Francisco, CA 94103
(415) 864-8555

Title: Highlights in the History of Forest Conservation
Publisher/Producer: U.S. Department of Agriculture - Forest Service (1976)
Format: Booklet
Content Description: Focuses on several distinct periods of development of forest conservation in America.
Concept: Forest conservation.
Price: $1.55
Order From: Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

Title: Minnesota Poverty - The Measure of Poverty
Publisher/Producer: Association of Minnesota Counties and the Minnesota Department of Economic Security
Format: Monograph
Content Description: The monograph presents the broad outlines of the 1980 census picture. Includes a poverty budget for 1983, where poor people live and poverty broken down into location by counties.
Order From: Minnesota Department of Economic Security
Office of Economic Opportunity
690 American Center Building
St. Paul, MN 55101
(612) 296-4657

Title: How Water Moves in the Soil
Publisher/Producer: American Society of Agronomy, Inc.
Format: Booklet.
Content Description: Six pages of photographs and script on movement of water in the soil.
Concept: Education
Price: $.50
Order From: Crops and Soils Magazine
677 South Segoe Road
Madison, WI 53711

Title: Conservation Tillage Information Center
Publisher/Producer: Conservation Tillage Information Center (CTIC)
Format: Pamphlet
Content Description: Describes purposes and activities of CTIC nationwide.
Concept: Education
Order From: Conservation Tillage Information Center
1025 Vermont Avenue Northwest, Suite 730
Washington, D.C. 20005

Title: 1983 National Survey Conservation Tillage Practices
Publisher/Producer: National Association of Conservation Districts
Format: 5 sheets
Content Description: Executive summary of acres by various tillage types.
Concept: Information
Order From: Conservation Tillage Information Center
1025 Vermont Avenue Northwest, Suite 730
Washington, D.C. 20005

Title: How a Tree Grows
Publisher/Producer: U.S. Department of Agriculture - Forest Service
Format: Pamphlet
Content Description: A conservation teaching aid describing how a tree grows.
Concept: Conservation education.
Order From: U.S. Department of Agriculture - Forest Service and Soil Conservation Service, Washington, D.C.

Title: Exploring the World of Plants and Soils
Publisher/Producer: National 4-H Field Crops Science Program Development Committee
Format: 2 booklets: Leader's guide and members manual.
Content Description: Introduces the wonderful world of plants and soils. It leads into the science of field crops production, soils management, and other adventures with growing things.
Order From: Agricultural Extension Service
University of Minnesota
St. Paul, MN 55101

Title: Windbreaks for Conservation
Publisher/Producer: U.S. Department of Agriculture
Format: Booklet - Agriculture Information Bulletin 339
Content Description: Describes the conservation values of windbreaks, soils and windbreak growth, planning, establishing and managing windbreaks.
Concept: Conservation education.
Order From: U.S. Department of Agriculture
Soil Conservation Service
Washington, D.C.

Title: Out Nation's Wetlands
Publisher/Producer: Interagency Task Force
Format: Booklet
Content Description: Written to provide a broad and balanced review of the status of our nation's wetlands. To provide lay readers with a scientific social, and political understanding of current wetland policies and concerns (1978).
Order From: Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

Title: Comprehensive Planning for Minnesota Communities
Publisher/Producer: Minnesota State Planning Agency
Format: Booklet
Content Description: Reference manual on planning for local officials, planning commissions, zoning boards, and other interested people.
Order From: Minnesota State Planning Agency
Office of Local and Urban Affairs
Capitol Square Building
550 Cedar Street
St. Paul, MN 55101

Title: You and Rural Zoning - Part I
Publisher/Producer: Agricultural Extension Service
Format: Booklet
Content Description: Exposes the reader to many of the fundamentals of rural zoning. Tells something of what it can and can't accomplish, and lists some of the common fallacies that confuse the issue.
Order From: Agricultural Extension Service
University of Minnesota
St. Paul, MN 55101

Title: County Zoning Administration - A Procedural Guide
Publisher/Producer: Minnesota State Planning Agency
Format: Booklet
Content Description: Purpose is to amplify state law regarding county zoning and to serve as a technical aid in the administration of county zoning ordinances.
Order From: Minnesota State Planning Agency
Office of Local and Urban Affairs
Capitol Square Building
550 Cedar Street
St. Paul, MN 55101

Title: Where Have the Farmlands Gone?
Publisher/Producer: National Agricultural Lands study (1980)
Format: Pamphlet
Content Description: Purpose is to make citizens aware of the need to preserve and protect the land
Concept: Land preservation
Order From: National Agricultural Lands Study
New Executive Office Building
722 Jackson Place Northwest
Washington, D.C. 20006
(202) 395-5832

Title: Conservation and the Water Cycle
Publisher/Producer: U.S. Department of Agriculture - Soil Conservation Service (1972)
Format: Pamphlet - Agriculture Information Bulletin No. 326
Content Description: To trace the movement of water through the cycle.
Concept: Water conservation
Price: $.10 each
Order From: Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

Title: That is a Watershed?
Publisher/Producer: U.S. Department of Agriculture - Soil Conservation Service (1960)
Format: Pamphlet
Content Description: To define and explain the term "watershed".
Concept: Soil conservation
Order From: Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

Title: Minnesota's Soils and Their Uses
Publisher/Producer: Agricultural Extension Service
Format: Booklet - Extension bulletin 383
Content Description: A reference for high school teachers. A collection of technical knowledge about Minnesota's soils that non-experts can readily use.
Concept: Soil conservation.
Order From: Agricultural Extension Service
University of Minnesota
St. Paul, MN 55108

Title: Energy Efficiency for Tomorrow's Field Crop Farmers
Publisher/Producer: Energy Awareness and Conservation Project - American Institutes for Research (1982)
Format: Booklet
Content Description: Gives ideas as to how farmers can conserve energy. It covers ways of using energy more efficiently in growing field crops.
Concept: Energy conservation.
Order From: American Association for Vocational Instructional Materials
120 Driftmier Engineering Center
Athens, GA 30602
(402) 542-2586

Title: Preserving Agricultural Land: Issues and Policy Alternatives.
Publisher/Producer: Council for Agricultural Science and Technology (1981)
Format: Booklet
Content Description: Analyzes the agricultural land preservation issue in a neutral manner, and brings scientific evidence to hear on questions of world food supply, agricultural land conservation, soil erosion, and policy alternatives and consequences.
Concept: Agricultural Land Preservation
Order From: Council for Agricultural Science and Technology (CAST)
250 Memorial Union
Ames, IA 50011
(515) 294-2036

Title: Know the Soil You Build On
Publisher/Producer: U.S. Department of Agriculture - Soil Conservation Service (1972)
Format: Booklet - Agriculture Information Bulletin No. 320
Content Description: Describes how an individual can choose good soils and good location before building.
Price: $.15
Order From: Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

Title: Farmland, Food and the Future
Publisher/Producer: Soil Conservation Society of America
Format: Book
Content Description: Education
Concept: The book looks at why farmland is being converted to non-farm uses, how the conversion process works, what the magnitude of conversions are, and how this affects the nation's ability to meet food needs.
Order From: Soil Conservation Society of America
7515 Northeast Ankeny Road
Ankeny, IA 50021

Title: Soil Erosion - The Work of Uncontrolled Water
Publisher/Producer: U.S.D.A.
Format: Pamphlet
Content Description: In-depth information on rill, gully and sheet erosion
Concept: Wind erosion
Order From: Soil Conservation Service
U.S. Department of Agriculture

Title: Modern Terraces for Soil Conservation
Publisher/Producer: Clifton Halsey
Format: Booklet
Content Description: Pictures and information on terraces.
Order From: Agricultural.

Title: Challenging Careers in Soil Conservation
Publisher/Producer: SCS
Format: Booklet
Content Description: Contains jobs available with the SCS and the amount of education needed for those jobs
Concept: Careers in SCS
Order From: Soil Conservation Service
U.S. Department of Agriculture

Title: A Time For Tenacity. Soil Stewardship Week, 1982.
Publisher/Producer: National Association of Conservation Districts
Format: Booklet and materials for church service
Content Description: Contains materials to be used in church service to recognize soil stewardship week, also an order form to order material.
Concept: Soil Stewardship
Order From: NACD Service Department
408 East Main, P.O. Box 855
League City, TX 77573

Title: Studying Soil Erosion and Its Control
Publisher/Producer: Clifton Halsey, Agriculture Extension Service, U of M
Grade Level: 9 and older
Format: 2-page booklet
Content Description: Contains activities for learning about soil erosion and how to control it. 1982.
Concept: Environmental Education
Order From: Agricultural Extension Service
University of Minnesota
St. Paul, MN 55108

Title: Conservation District Guide For Education Programs
Publisher/Producer: National Association of Conservation Districts
Format: Booklet
Content Description: Contains a step by step approach designed to help a conservation district to plan and carry out a successful, effective, coordinated program of environmental education.
Concept: Environmental Education
Price: $2.50
Order From: National Association of Conservation Districts
408 East Main Street, P.O. Box 855
League City, TX 77573

Title: Bring Textbooks to Life, What is a Watershed?, Conservation and the Water Cycle
Publisher/Producer: SCS
Format: 2 pamphlets
Content Description: Contains introductory material on the above titles
Concept: Information
Order From: Soil Conservation Service
U.S. Department of Agriculture

Title: Outdoor Classrooms on School Sites
Publisher/Producer: SCS
Grade Level: K-12
Format: Booklet
Content Description: Contains ideas on how to set up and develop an on-site outdoor classroom. This will help students better understand the environment and how to conserve it.
Concept: Conservation Education
Price: $.50 minimum $1 order, 25% discount on 100 or more.
Order From: Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

Title: Environmental Education in Action
Publisher/Producer: SCS
Format: 4 booklets
Content Description: Contains reprints from Soil Conservation magazine. These reprints deal with conservation education.
Concept: Conservation Education
Order From: Soil Conservation Service
U.S. Department of Agriculture

Title: Toward An Action Plan: A Report on the Intergovernmental Conference on Environmental Education
Publisher/Producer: U.S. Department of Health, Education and Welfare
Format: Booklet - 33 pages
Content Description: Discusses the deliberations and resolutions of the United Nation's Intergovernmental Conference on Environmental Education. 1978.
Concept: Environmental Education Worldwide
Price: For sale
Order From: Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402
Stock Number: 017-080-01838-1

Title: 100 Ways To Do Something About Improving the Environment
Publisher/Producer: Soil Conservation Service
Format: 8 page paper
Content Description: Contains suggestions for projects in environmental conservation and ecological studies.
Concept: Improve the Environment
Order From: Soil Conservation Service, Educational Relations Section, Information Division, U.S. Department of Agriculture, Washington, D.C. 20250

Title: Agriculture in the Classroom. A Plan For Action at the State Level
Publisher/Producer: USDA
Format: 2 papers
Content Description: Agriculture Education
Concept: Contains summary, comments and recommendations of a National Workshop on Teaching About Agriculture in America's Classrooms. Also Plan for Action.
Order From: USDA

Title: Investigating Your Environment
Publisher/Producer: Forest Service, U.S. Department of Agriculture
Format: Folder - lesson plans
Content Description: Contains lesson plans that allow for collections, recording, and interpreting information about different parts of the environment and also the application of those interpretations.
Concepts: Environment
Price: For sale
Order From: Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402
Stock Number: 001-001-00446-4

Title: Shell Films
Publisher/Producer: Shell Oil Company
Format: Order booklet catalogue
Content Description: Contains list of films and order blank including "Food - or - Famine", "This Land"
Concept: Education
Order From: Shell Film Library
1433 Sadlier Circle West Drive
Indianapolis, IN 46239

Title: Film Distribution Center
Publisher/Producer: Film Distribution Center
Format: Listing
Content Description: Contains listing of movies that can be rented or borrowed.
Concept: Education
Order From: Film Distribution Center
028 Industry Drive
Seattle, WA 98188

Also: Venard Films Ltd.
Box 1332
Peoria, IL 61654

Title: Minnesota State Documents Center Catalog
Publisher/Producer: Minnesota State Document Center
Format: Booklet
Content Description: Contains subject headings and books to order under those headings.
Concept: Information
Order From: Minnesota State Documents Center
117 University Avenue
St. Paul, MN 55155

Title: Computer Produced Subject Bibliographies
Publisher/Producer: J.J. Hill Reference Library
Format: Leaflet
Content Description: Explains how they can make a subject search for you.
Concept: Information
Order From: J.J. Hill Reference Library
4th Street and Market
St. Paul, MN 55102

Title: Eric/Cress
Publisher/Producer: Eric/Cress
Format: Booklet
Content Description: Provides materials to teachers and others for use in Rural Education, Small Schools, Outdoor Education and others.
Concept: Education
Order From: Eric/Cress
Box 3AP
New Mexico State University
Las Cruces, NM 88003

Title: Soil: Acidity, Moisture, Minerals and Organisms
Publisher/Producer: National Wildlife Federation
Grade Level: 2-9
Format: Booklet
Content Description: Each student studies his own plot to discover and then measure some of the different factors present. By testing their plots for moisture content, acidity and alkalinity, minerals, and organisms present, students can see that various soil factors influence types of vegetation found in an area.
Concept: Experimental Education
Price: $1.50
Order From: National Wildlife Federation
1412 - 16th Street N.W.
Washington, D.C. 20036

ACTIVITIES BY GRADE

Kindergarten

Component 1 - Soil Types
Component 2 - Plants Need Soil and/or Water
Component 3 - Who Needs Soil?
Component 4 - Compare How Much Moisture Different Soil Holds
Component 5 - Running Water and Walking Water
Component 6 - How Do People Change Soil?
Component 9 - Soil Is Lost By Wind Erosion
Component 10 - Compare Soils By Growing Plants

Grade One

Component 1 - Soil Types
Component 2 - Plants Need Soil and/or Water
Component 3 - Who Needs Soil?
Component 4 - Compare How Much Moisture Different Soil Holds
Component 5 - Running Water and Walking Water
Component 6 - How Do People Change Soil
Component 9 - Soil Is Lost By Wind Erosion
Component 10 - Compare Soils By Growing Plants

Grade Two

Component 1 - Soil Types
Component 2 - Plants Need Soil and/or Water
Component 3 - Who Needs Soil?
Component 4 - Compare How Much Moisture Different Soil Holds
Component 5 - Running Water and Walking Water
Component 6 - How Do People Change Soil?
Component 9 - Soil is Lost By Wind
Component 10 - Compare Soils By Growing Plants
Component 11 - Healthy Roots Are Important
Component 12 - Happy Soil, Sad Soil
Component 16 - Farmland Is Lost

Grade Three

Component 1 - Soil Types
Component 2 - Plants Need Soil and/or Water
Component 4 - Compare How Much Moisture Different Soils Hold
Component 9 - Soil Is Lost By Wind Erosion
Component 10 - Compare Soils By Growing Plants
Component 12 - Happy Soil, Sad Soil
Component 16 - Farmland Is Lost

Grade Four

Component 1 - Soil Types
Component 4 - Compare How Much Moisture Different Soils Hold
Component 8 - Soil Is Lost By Water Erosion
Component 9 - Soil Is Lost By Wind Erosion
Component 10 - Compare Soils By Growing Plants
Component 11 - Healthy Roots Are Important
Component 12 - Happy Soil, Sad Soil
Component 16 - Farmland Is Lost
Component 19 - Soil Must Be Protected

Grade Five

Component 1 - Soil Types
Component 4 - Compare How Much Moisture Different Soil Holds
Component 7 - Water: Where It Comes From, Where It's Going
Component 8 - Soil Is Lost By Water Erosion
Component 10 - Compare Soils By Growing Plants
Component 11 - Healthy Roots Are Important
Component 12 - Happy soil, Sad Soil
Component 13 - Minnesota's Soil Produces Much Food
Component 14 - Dirt, Who Needs It?
Component 15 - Disappearing Farmland In Minnesota
Component 19 - Soil Must Be Protected

Grade Six

Component 1 - Soil Types
Component 4 - Compare How Much Moisture Different Soils Hold
Component 7 - Water: Where It Comes From, Where It's Going
Component 8 - Soil Is Lost By Water Erosion
Component 9 - Soil Is Lost By Wind Erosion
Component 10 - Compare Soils By Growing Plants
Component 11 - Healthy Roots Are Important
Component 12 - Happy Soil, Sad Soil
Component 13 - Minnesota's Soil Produces Much Food
Component 14 - Dirt, Who Needs It?
Component 15 - Disappearing Farmland In Minnesota
Component 18 - Land Use: Whose Responsibility?
Component 19 - Soil Must Be Protected
Component 20 - Everything In Its Place
Component 21 - Why Are People Hungry?
Component 22 - Who Is Hungry In The United States?

ACTIVITIES BY SUBJECT

Art

Component 3 - Who Needs Soil?
Component 6 - How Do People Change Soil?

Geography

Component 21 - Why Are People Hungry?

Health

Component 21 - Why Are People Hungry?
Component 22 - Who Is Hungry In The U.S.A.?

Language Arts

Component 3 - Who Needs Soil?
Component 6 - How Do People Change Soil?
Component 12 - Happy Soil, Sad Soil

Math

Component 15 - Disappearing Farmland In Minnesota
Component 21 - Why Are People Hungry?
Component 22 - Who Is Hungry In The U.S.A.?

Science

Component 1 - Soil types
Component 2 - Plants Need Soil and/or Water
Component 3 - Who Needs Soil?
Component 4 - Compare How Much Moisture Different Soils Hold
Component 5 - Running Water and Walking Water
Component 6 - How Do People Change Soil?
Component 7 - Water: Where It Comes From, Where It's Going
Component 8 - Soil Is Lost By Wind Erosion
Component 9 --Soil Is Lost By Wind Erosion
Component 10 - Compare Soils By Growing Plants
Component 11 - Healthy Roots Are Important
Component 14 - Dirt, Who Needs It?
Component 19 - Soil Must Be Protected
Component 20 - Everything In Its Place

Social Studies

Component 6 - How Do People Change Soil?
Component 7 - Water: Where It Comes From, Where It's Going
Component 8 - Soil Is Lost By Water Erosion
Component 13 - Minnesota's Soil Produces Much Food
Component 16 - Farmland Is Lost
Component 17 - You've Got Me Covered
Component 18 - Land Use: Whose Responsibility?
Component 19 - Soil Must Be Protected
Component 20 - Everything In Its Place
Component 21 - Why Are People Hungry?
Component 22 - Who Is Hungry In The U.S.A.?

CROSS REFERENCE BY SKILLS

Analysis

Component 1 - Soil Types
Component 3 - Who Needs Soil?
Component 4 - Compare How Much Moisture Different Soil Holds
Component 6 - How Do People Change Soil?
Component 7 - Water: Where It Comes From, Where It's Going
Component 10 - Compare Soils By Growing Plants
Component 11 - Healthy Roots Are Important
Component 13 - Minnesota's Soil Produces Much Food
Component 16 - Farmland Is Lost
Component 17 - You've Got Me Covered
Component 18 - Land Use: Whose Responsibility?
Component 19 - Soil Must Be Protected
Component 20 - Everything In Its Place
Component 21 - Why Are People Hungry?
Component 22 - Who Is Hungry In The U.S.A.?

Application

Component 2 - Plant Need Soil and/or Water
Component 4 - Compare How Much Moisture Different Soils Hold
Component 7 - Water: Where It Comes From, Where It's Going
Component 8 - Soil Is Lost By Water
Component 9 - Soil Is Lost By Wind Erosion
Component 10 - Compare Soils By Growing Plants
Component 11 - Healthy Roots Are Important
Component 13 - Minnesota's Soil Produces Much Food
Component 14 - Dirt, Who Needs It?
Component 16 - Farmland Is Lost
Component 17 - You've Got Me Covered
Component 18 - Land Use: Whose Responsibility?
Component 20 - Everything In Its Place
Component 22 - Who Is Hungry In The U.S.A.?

Brainstorming

Component 21 - Why Are People Hungry?

Chart Reading

Component 22 - Who Is Hungry In The U.S.A.?

Classification

Component 1 - Soil Types
Component 3 - Who Needs Soil?
Component 4 - Compare How Much Moisture Different Soils Hold
Component 10 - Compare Soils By Growing Plants
Component 12 - Happy Soil, Sad Soil

Comparison and Contrast

Component 1 - Soil Types
Component 4 - Compare How Much Moisture Different Soils Hold
Component 6 - How Do People Change Soil?

Comparison and Contrast (continued)

Component 7 - Water: Where It Comes From, Where It's Going
Component 10 - Compare Soils By Growing Plants
Component 12 - Happy Soil, Sad Soil
Component 15 - Disappearing Farmland In Minnesota
Component 16 - Farmland Is Lost
Component 17 - You've Got Me Covered
Component 18 - Land Use: Whose Responsibility?
Component 19 - Soil Must Be Protected
Component 20 - Everything In Its Place
Component 21 - Why Are People Hungry?
Component 22 - Who Is Hungry In The U.S.A.?

Comprehension

Component 22 - Who Is Hungry In The U.S.A.?

Computation

Component 15 - Disappearing Farmland In Minnesota
Component 22 - Who Is Hungry In The U.S.A.?

Description

Component 3 - Who Needs Soil?
Component 6 - How Do People Change Soil?
Component 7 - Water: Where It Comes From, Where It's Going
Component 10 - Compare Soils By Growing Plants
Component 11 - Healthy Roots Are Important
Component 12 - Happy Soil, Sad Soil
Component 16 - Farmland Is Lost
Component 18 - Land Use: Whose Responsibility?
Component 20 - Everything In Its Place

Discussion

Component 3 - Who Needs Soil?
Component 5 - Running Water and Walking Water
Component 6 - How Do People Change Soil?
Component 8 - Soil Is Lost By Water Erosion
Component 9 - Soil Is Lost By Wind Erosion
Component 10 - Compare Soils By Growing Plants
Component 12 - Happy Soil, Sad Soil
Component 13 - Minnesota's Soil Produces Much Food
Component 16 - Farmland Is Lost
Component 17 - You've Got Me Covered
Component 18 - Land Use: Whose Responsibility?
Component 19 - Soil Must Be Protected
Component 20 - Everything In Its Place
Component 21 - Why Are People Hungry?
Component 22 _ Who Is Hungry In The U.S.A.?

Drawing

Component 3 - Who Needs Soil?
Component 5 - Running Water and Walking Water
Component 7 - Water: Where It Comes From, Where It's Going
Component 10 - Compare Soils By Growing Plants
Component 12 - Happy Soil, Sad Soil
Component 16 - Farmland Is Lost
Component 20 - Everything In Its Place

Evaluation

Component 2 - Plants Need Soil and/or Water
Component 4 - Compare How Much Moisture Different Soils Hold
Component 5 - Running Water and Walking Water

Evaluation (continued)

- Component 7 - Water: Where It Comes From, Where It's Going
- Component 10 - Compare Soils By Growing Plants
- Component 12 - Happy Soil, Sad Soil
- Component 15 - Disappearing Farmland In Minnesota
- Component 16 - Farmland Is Lost
- Component 17 - You've Got Me Covered
- Component 18 - Land Use: Whose Responsibility?
- Component 19 - Soil Must Be Protected
- Component 20 - Everything In Its Place
- Component 21 - Why Are People Hungry?
- Component 22 - Who Is Hungry In The U.S.A.?

Expressive Writing

- Component 12 - Happy Soil, Sad Soil
- Component 21 - Why Are People Hungry?
- Component 22 - Who Is Hungry In The U.S.A.?

Generalization

- Component 1 - Soil Types
- Component 2 - Plants Need Soil and/or Water
- Component 3 - Who Needs Soil?
- Component 4 - Compare How Much Moisture Different Soils Hold
- Component 5 - Running Water and Walking Water
- Component 6 - How Do People Change Soil?
- Component 7 - Water: Where It Comes From, Where It's Going
- Component 8 - Soil Is Lost By Water Erosion
- Component 9 - Soil Is Lost By Wind Erosion
- Component 10 - Compare Soils By Growing Plants
- Component 11 - Healthy Roots Are Important
- Component 12 - Happy Soil, Sad Soil
- Component 13 - Minnesota's Soil Produces Much Food
- Component 14 - Dirt, Who Needs It?
- Component 16 - Farmland Is Lost
- Component 17 - You've Got Me Covered
- Component 18 - Land Use: Whose Responsibility?
- Component 19 - Soil Must Be Protected
- Component 20 - Everything In Its Place

Graphing

- Component 21 - Why Are People Hungry?

Inference

- Component 7 - Water: Where It Comes From, Where It's Going
- Component 8 - Soil Is Lost By Water Erosion
- Component 10 - Compare Soils By Growing Plants
- Component 12 - Happy Soil, Sad Soil
- Component 13 - Minnesota's Soil Produces Much Food
- Component 14 - Dirt, Who Needs It?
- Component 15 - Disappearing Farmland In Minnesota
- Component 19 - Soil Must Be Protected
- Component 20 - Everything In Its Place

Listing

- Component 12 - Happy Soil, Sad Soil
- Component 14 - Dirt, Who Needs It?
- Component 17 - You've Got Me Covered

Mapping

- Component 7 - Water: Where It Comes From, Where It's Going

Media Construction

Component 13 - Minnesota's Soil Produces Much Food

Observation

Component 3 - Who Needs Soil?
Component 4 - Compare How Much Moisture Different Soils Hold
Component 5 - Running Water and Walking Water
Component 6 - How Do People Change Soil?
Component 7 - Water: Where It Comes From, Where It's Going
Component 8 - Soil Is Lost By Water Erosion
Component 9 - Soil Is Lost By Wind Erosion
Component 10 - Compare Soils By Growing Plants
Component 11 - Healthy Roots Are Important
Component 16 - Farmland Is Lost
Component 17 - You've Got Me Covered
Component 18 - Land Use: Whose Responsibility?
Component 19 - Soil Must Be Protected
Component 20 - Everything In Its Place

Problem Solving

Component 7 - Water: Where It Comes From, Where It's Going
Component 13 - Minnesota's Soil Produces Much Food
Component 18 - Land Use: Whose Responsibility?
Component 22 - Who Is Hungry In The U.S.A.?

Public Speaking

Component 17 - You've Got Me Covered
Component 18 - Land Use: Whose Responsibility?

Reporting

Component 3 - Who Needs Soil?
Component 7 - Water: Where It Comes From, Where It's Going

Research

Component 7 - Water: Where It Comes From, Where It's Going
Component 11 - Healthy Roots Are Important

Synthesis

Component 7 - Water: Where It Comes From, Where It's Going
Component 13 - Minnesota's Soil Produces Much Food
Component 20 - Everything In Its Place

Visualization

Component 2 - Plants Need Soil and/or Water
Component 6 - How Do People Change Soil?
Component 7 - Water: Where It Comes From, Where It's Going
Component 8 - Soil Is Lost By Water Erosion
Component 9 - Soil Is Lost By Wind Erosion
Component 13 - Minnesota's Soil Produces Much Food
Component 14 - Dirt, Who Needs It?
Component 15 - Disappearing Farmland In Minnesota
Component 16 - Farmland Is Lost
Component 17 - You've Got Me Covered
Component 19 - Soil Must Be Protected
Component 20 - Everything In Its Place

ACKNOWLEDGEMENTS

Minnesota's Ag-Stravaganza is made available as the result of the concerned and dedicated efforts of thousands of people.

We extend thanks in a general way to the teachers and thousands of students in kindergarten through grade six who participated in the pilot and field test stages of the curriculum development.

Reviewers of MINNESOTA's AG-STRAVAGANZA Curriculum Framework

Harold Anderson - Soil and Water Conservation Board, West Central Administrative Region, Staples, Minnesota
Carmen Borgerding - Minnesota Environmental Education Board, Regional Coordinator, REEC's 7E, 9, and 10, Minneapolis, Minnesota
Clifton Halsey - Extension Soil Scientist, Soil Conservation, University of Minnesota
Glynnis Jones - Governor's Council on Rural Development, St. Paul, Minnesota
Gene Lindquist - Region Five Development Commission, Staples, Minnesota
Francis Mahal - Teacher, Wabasso, Minnesota
Kathy McRae - Teacher, St. Paul, Minnesota
John Miller - Environmental Education, Minnesota State Department of Education, St. Paul, Minnesota
Stephen Reckers - Planning Division, State Planning Agency, St. Paul, Minnesota.
Marie Smith - Teacher, Wells, Minnesota
Mary Tachney - Minnesota Catholic Conference, St. Paul, Minnesota

Pilot Teachers, Administrators, Resource Personnel

Rodney Anderson, Sixth Grade Teacher, Dawson
Tim Arit, Steele County Agronomist
Karen Bailey, Fourth Grade Teacher, Owatonna
Nancy T. Bambenek, Fourth Grade Teacher, Winona
Robert Banston, Fourth and Fifth Grade Teacher, Wadena
Joanne Bauer, Second Grade Teacher, St. Cloud
Jim Birkholz, Soil and Water Conservation Service
Arlene Bjornson, First Grade Teacher, Hayfield
Kate Brady, Soil Conservation Service
Sr. Carleen Brennan, Fifth Grade Teacher, St. Paul
Lynn Buldhaupf, Kindergarten Teacher, Chandler-Lake Wilson
Harry Bush, Elementary Instructor, Quarry Hill Nature Center, Rochester
Lindsey Cartwright, Fifth Grade Teacher, Windom
Thomas Coffman, District Conservationist, Steele County
John Comstock, Evaluation Specialist, Minnesota Department of Education
Julie Copeland, Environmental Conservation Library (ECOL), Minneapolis Public Library
Joe Cummins, Retired Soil Specialist
Robert DeGrood, Farmer, Faribault
Joe DeGrood, Farmer, Faribault
Connie Dugstad, Sixth Grade Teacher, Oklee
Jan Duscher, First Grade Teacher Windom

Evodia Gerogeorge, Second Grade Teacher, Duluth
Lorance Geske, Principal, Wabasso
Mary Grausan, Fourth Grade Teacher, Springfield
Eula Hagg, Fourth Grade Teacher, Pillager
Cliff Halsey, Department of Soil Services, University of Minnesota
Beverly Hams, Second Grade Teacher, Oak Grove Elementary, Bloomington
Janet Hatle, Third and Fourth Grade Teacher, Oak Grove Elementary, Bloomington
Charles Hayes, Fifth Grade Teacher, Chandler-Lake Wilson
Sharon Heard, Fourth Grade Teacher, Chandler-Lake Wilson
Janet Heiar, Kindergarten Teacher, Winona
Sr. Agatha Hermann, Fifth Grade Teacher, Moorhead
Bernice Hiemenz, Second Grade Teacher, Watkins
Chuc Hitt, Mankato State University, Computer Services
Loyal Hyatt, Agriculture Instructor, Forest Lake
Pat Jaeger, First Grade Teacher, Isanti
Irene Jeddeloh, Third Grade Teacher, Owatonna
Dr. John Komarek, Veterinarian, Lonsdale
Diane Johnson, Fourth Grade Teacher, Cambridge
Delphia Johnson, Sixth Grade Teacher, Argyle
Sister Jon Paul Stanley, Intermediate Teacher, Lonsdale
Sister Kathleen Fernholz, Pastoral Administrator, Wanda
Jeanette Kleve, Principal, Rochester
Kathy Klindt, Sixth Grade Teacher, Detroit Lakes
Patricia Kramer, Fifth Grade Teacher, Oak Grove Elementary, Bloomington
Jean Krause, Second Grade Teacher, Owatonna
Doloris Krile, Second Grade Teacher, Moorhead
Ron Kroese, Land Stewardship Project, Director
Byron Kunkel, Blue Earth County Extension Office
Lucille Kutzke, Fourth Grade Teacher, Cambridge
Mary Laatsch, Third Grade Teacher, St. Paul
Terry Lambaere, First Grade Teacher, Owatonna
Colleen Lanes, First Grade Teacher, Pillager
Sr. Mary Daniel Leintz, First Grade Teacher, St. Paul
Cal Lindman, Fifth Grade Teacher, Oak Grove Elementary, Bloomington
Dr. Lois Lance, Principal, Field Elementary, Minneapolis
Dorothy Lueth, Fourth Grade Teacher, Winona
Ruth MacIver, Kindergarten Teacher, Oak Grove Elementary, Bloomington
Marilyn Mack, Statewide Poster Contest
Francis Mahal, Third and Fourth Grade Teacher, Wabasso
Mary Markell, Audio-Visual Coordinator, Owatonna
Sister Mary Tachney, Rural Life Director, Minnesota Catholic Conference
Mary Mattson, Principal, Lake Wilson
Ellein McDaniel, Superintendent, Olivia
Sister Joann McMahon, Principal, Litomysl
Kathy McRae, Eighth Grade Teacher, St. Paul
Virgil Mears, Assistant Superintendent, Director of Education, Special Education Coordinator, Shakopee
Annetta Miller, Third Grade Teacher, Chandler-Lake Wilson
David and Florence Minar, Farming, New Prague
Craig Moore, Sixth Grade Teacher, Windom
Marilyn C. Nelson, Third Grade Teacher, Windom
Beth Nelson, Second Grade Teacher, Brewster
Jim Nichols, Commissioner of Agriculture

August Noy, Retired Farmer, Faribault
Jane Nygren, Fifth Grade Teacher, Pillager
Vicki Okeson, Fifth Grade Teacher, Detroit Lakes
Robert Olson, Sixth Grade Teacher, Duluth
Pam Owen, Kindergarten Teacher, Owatonna
Joe and Nancy Paddock, Land Stewardship Project
Merrily Pehoski, Second Grade Teacher, Oak Grove Elementary, Bloomington
Pam Pfaffle, Forestry Intern, Environmental Learning Center, Isabella
Dr. Margaret Preska, President, Mankato State University
Margaret E. Reagan, Fourth Grade Teacher, Watkins
Bonnie Rennpford, Sixth Grade Teacher, Owatonna
Christine Robinson, First Grade Teacher, Isanti
Doris Rubsam, Fourth Grade Teacher, Brewster
Olivia Sazl, Fifth Grade Teacher, Watkins
Ann Schleper, Kindergarten, St. Cloud
Lynn Schnettler, Fifth Grade Teacher, St. Cloud
Jim Schultz, Principal, Owatonna
Don Schuster, Blue Earth County Soil Conservation Department
Larry Schwie, Agriculture Instructor, Dakota County Area Vocational Technical Institute
Beatrice Shemon, Fifth Grade Teacher, Wabasso
Sherry Skirkey, Kindergarten Teacher, Windom
Sr. Marie Smith, First Grade Teacher, Wells
Cinda Stanek, Naturalist, Environmental Learning Center
Eilleene Stawarski, Fourth Grade Teacher, St. Cloud
Mildred Strand, First Grade Teacher, Chandler-Lake Wilson
William Streff, Principal, Shakopee
Rose Ella Subbert, Third Grade
Jane Swanson, Fourth Grade Teacher, Isanti
Don Talbert, Education Committee of Minnesota Association of Water and Soil Conservation
Larry Tande, Steele County Extention Service
Linda Traczyk, Fifth Grade Teacher, Owatonna
Allan Ulseth, Intermediate Environmentalist, Field Elementary, Minneapolis
Sister Padua Unterburger, Kindergarten Teacher, LaCrescent
Gil Valdez, Curriculum Specialist, Minnesota Department of Education
Sue Wacek, Sixth Grade Teacher, Owatonna
Sr. Antonette Marie Wagner, Sixth Grade Teacher, St. Paul
Roberta Wentzel, Sixth Grade Teacher, Chandler-Lake Wilson
Cindy Wesley, Fifth and Sixth Grade Teacher, Wells
Lenore M. Wilson, Third Grade Teacher, Brewster
Lorette Woelfel, Third Grade Teacher, Wabasso
Sister Rita Wollschlager, Lead Teacher, Veseli
Linda Wright, Agricultural Statistics
Joan York, Second Grade Teacher, Chandler-Lake Wilson
Ruth M. Zauhar, Third Grade Teacher, Pillager
Joanne Zeman, Farming, Owatonna
Jim Zimmerman, Farming, Waseca
John Zwiebel, Agriculture Instructor, Owatonna

Governor's Council on Rural Development

Chair, Lt. Governor Marlene Johnson
Region 1 - Harry Sjulson
Region 2 - Stan Cornelius
Region 3 - Warren Youngdahl
Region 4 - Marion Kershner
Region 5 - Gene Lindquist
Region 6E - Pat Kubesh
Region 6W - Tom Johnson (Vice Chair)
Region 7E - Laurence Collin

Governor's Council on Rural Development (continued)

Region 7W - Maurine Pederson
Region 8 - Carl Hauschild
Region 9 - Jim Stangler
Region 10 - Portia Howe
Region 11 - Mary Hauser

Farm and Agricultural Land Task Force Members

Region 6W - Tom Johnson, Chair
Region 5 - Gene Lindquist
Region 6E - Pat Kubesh
Region 7E - Laurence Collin
Region 10 - Portia Howe
Region 11 - Mary Hauser
At Large, Marion Fogarty
Farmers Home Administration, Gary Loff
Agricultural Extension Service, Lois Mann
USDA Soil Conservation Service, John Edwards
Southwest State University Robert Johnson
State Planning Agency, Stephen Reckers

Special Personnel and Materials Assistance

United States Department of Agriculture,
Soil Conservation Service,
Agricultural Stabilization and Conservation Service,
Agricultural Extension Service, Minnesota Department of Natural Resources
Minnesota Department of Education
Minnesota Association of Soil and Water Conservation Districts,
Minnesota Educational Association,
University of Minnesota Technical College (Waseca), Continuing Education Department, Minnesota Pollution Control Agency, Soil and Water Conservation Board, Future Farmers of America,

Special Personnel and Materials Assistance (continued)

Minnesota Environmental Education Board, Minnesota Federation of Teacher, Minnesota Elementary School Principals' Association,
Minnesota State Planning Agency,
Minnesota School Boards Association,
National Association of Conservation Districts, Minnesota Congress of Parents, Teachers and Students.

Copy Editing Assistance: Kathy McRae and Mary Tacheny.

Assembling of Notebooks: Clients of the Cooperative Work Transition Project, St. Paul, Minnesota.

PREFACE

"Minnesota is losing ground--literally. Over 100 million tons of topsoil erode yearly from the state's cropland. That's enough soil to bury both sides of I-94 twelve feet under from Minneapolis to Miles City, Montana.

Minnesota is losing ground in another way. Annually, 49,000 acres of farmland are lost to urban encroachment. Daily, an average of 134 acres of cropland is bulldozed for highways, housing developments, and other nonagricultural uses. One-third of this converted land is prime farmland, the state's richest and most productive land.

What impact does this soil loss and conversion of farmland have on you? Plenty. Farmers have to plant on less productive land, which requires more fertilizer and additional costs. As the farmer's cost go up, so do the consumer's.[1]

Loss of soil is considered among the top ten problems in the United States today.

During the 1950's and 1960's an era of unprecendented advances in agriculture, there seemed to be little reason to be concerned about conversion of cropland to urban uses.

Now, there are no more agricultural frontiers in the United States. For the first time in this nation's history, each new highway, factory, shopping center, power plant or housing development threatens to permanently reduce the productive capacity of American agriculture.

During the 1970's, a combination of factors--escalating world demand for food, unfavorable weather, soil erosion, loss of thousands of acres of prime food-producing land to non-agricultural uses--created statistics that mandated a need to plan for food production.

Available evidence suggests that agricultural technology and resources such as new crop varieties, irrigation, fertilizer and energy have limitations and cannot indefinitely compensate for the loss of acres of farmland. Increases in food production due to technological advances have declined from 2 1/2 percent to 1 percent.

As world population figures mount, so does the need for food. Between 1975-2000, the increase in world population is projected to be 2.3 billion people, compared to the 1.5 billion increase from 1950-1975.[3] The population increase indicates that nonfarm claims on cropland--urbanization, energy production and transportation--will certainly increase also.

Somehow, on an elementary level, it is necessary to raise the student's awareness of the loss of agricultural land. Students are aware of the need for agricultural land; it produces their food. The preserving of this most necessary resource is now reaching a critical stage. We must preserve it so our children may be fed, clothed and sheltered, and so our children's children may also have that assurance.

[1] "Minnesota's Farmland: An Endangered Resource," (St. Paul: U.S.D.A. - Soil Conservation Service).

[2] Lester R. Brown, Building a Sustainable Society (New York: W.W. Norton and Company, 1981) pp. 103, 104.

[3] Brown, Building a Sustainable Society p. 141.

Governor's
COUNCIL ON RURAL DEVELOPMENT

900 American Center Building
150 E. Kellogg Boulevard
St. Paul, Minnesota 55101
(612) 296-3993

INTRODUCTION

Land, soil and water are the life support system for an ever increasing world population. With our own eyes we see our farmlands, both quantity and quality, disappear. In our mind we know the world population is increasing every day. Common sense tells us that we cannot indefinitely feed more and more people with less land, poorer soil and polluted water.

Each month we see thousands of tons of top soil washed down to the oceans, and thousands of acres of farm land change to other irreversible uses. There is no source from which to draw more land, soil or clean water when the time comes that they are needed. We must all cherish and guard this blessed miracle of life. We must not squander this most valuable resource in pursuit of short term profit. That would be tragic.

The Farm and Ag Task Force of the Governor's Council on Rural Development believes that agriculture in the classrooms is a very effective way of helping people become aware of what is happening out in the country that will affect us or our decendents some day.

I passionately believe that the perceptive few who have the opportunity to see the ultimate disaster ahead must band together now to warn the slumbering many.

Knowing teachers and their dedication to a worthy cause, I'm sure they can be relied on to accomplish this task.

Laurence Collin

Laurence Collin, Chairman
Curriculum Advisory Committee

AN EQUAL OPPORTUNITY EMPLOYER

RATIONALE

This curriculum is an endeavor to alert elementary teachers and students to the need to protect and conserve one of Minnesota's basic resources--SOIL.

What is happening NOW to Minnesota's soil? Is soil a critical issue? Why?

Each day over 100 acres of Minnesota's soil are covered with asphalt and cement for residential, commercial, and public development. This is a staggering amount. It is practically impossible to convert an airport or highways or shopping centers or housing development areas back to productive farmland. Will we continue to allow our farmland to disappear so quickly? Or will we adopt some wise planning procedures for the use of our prime agricultural land?

Also, erosion is ravaging our state's topsoil. Minnesota is losing topsoil at an alarming rate. Will we allow the eight inches of rich topsoil to blow away or to be washed away (as is happening in some counties now), or will we begin NOW to understand and value our soil, and to express our concern in logical soil conservation measures?

The ideas and activities suggested in Minnesota's Ag-Stravaganza are intended to raise our awareness to the tremendous loss of prime agricultural land, land which is vital to food production. This awareness is directly related to the fact, that as each of us is supplied daily with the basics of life by the soil, so each of us bears responsibility for conserving and protecting the soil.

Fertile soil and favorable temperature enable Minnesota to be the heartland for food and fiber pdoduction. Every farmer in Minnesota feeds 78 other people.

Still there are hungry people in Minnesota and in the United States. What is our responsibility to protect our soil from erosion loss and unplanned development so there will be enough food to keep people from starving? Is this our concern? Or are we free to use Minnesota's soil as we choose for our own immediate gain?

Do we have an obligation to .. future generations? .. people elsewhere in the United States that don't have the kind of soil or terrain or moisture or weather conducive to growing crops?

The loss of agricultural land refers to .. loss of cropland, .. loss of forestland, .. loss of pastureland, .. loss of wetland

To provide more cropland, sometimes forestland is chopped down. Often the converted forestland is marginal farmland, easily eroded by wind and water.

To provide more cropland, sometimes wetlands are drained. Drained wetlands are inferior agricultural lands and extremely unsuitable for use as urban and industrial building sites.

To provide more cropland, sometimes natural pastureland is cultivated. Now, uncovered, it is subject to wind and water erosion which depletes its fertility.

Statewide, segments of Minnesota residents who are concerned about the loss of agricultural land are sensing the need for legislative action to protect and conserve the soil.

Will you, as teachers of the next generation of land users and land planners, help children to become aware of the need to protect agricultural land?

The choice to learn basic facts about our soil, its characteristics, its destroyers, and ways to protect and conserve soil is ours. SOIL is alive and gives life. Will we assume the responsibility to sustain its life?

---

[1] "Minnesota's Farmland: An Endangered Resource," (St. Paul: U.S.D.A. - Soil Conservation Service).

[2] "America's Soil and Water: Condition and Trends," (U.S.D.A. - Soil Conservation Service), 1981, page 9).

[3] "Agriculture...What Has It Done For Minnesota Lately," (St. Paul: Minnesota Agricultural Statistics Service).

HOW TO USE THIS BOOK

A Supplement to Existing Courses and Programs

Instructional activities of Minnesota's Ag-Stravaganza are designed for easy integration into school subject and skill areas - especially science, social studies, language arts, mathematics, and art - so that classroom teachers may use the materials as a means by which to teach required concepts and skills... at the same time teaching about people, agricultural land and the environment. Educators in non- school settings, such as 4H leaders, Soil and Water Conservation personnel, scout leaders, and others also find the materials of use.

Organization of the Materials

The first draft of this curriculum was developed by age levels to correspond to the grade levels at which children could grasp soil related concepts. But as the curriculum was piloted by teachers statewide, it became apparent that soil concepts developed for kindergarten students could be functional for all grades.

So, in the revision, the curriculum concepts were developed topically, with a grade level recommendation.

SECTION I: What is Soil?

Kindergarten students can see soil and feel soil. These concepts, with minor modifications for the age level of students, can also be taught in grades one through six. The environmental background of students can be so different, depending on rural or urban living and the instructional emphasis of the school.

SECTION II: Relationship of Soil to Wind and Water

Activities in this section will provide students with information as to how different types of soils are affected by wind, and water. Students will be given an opportunity to consider how the practices of people affect the soil and its relationship to wind and water. The concepts in this section are applicable to grades K-6.

SECTION III: Relationship of Soil to Plants

Activities in this section are designed to provide students with information as to how different types of soil affect the growth of plants. Students will also be given an opportunity to consider how different types of plant growth affect the soil - happy soil/sad soil. Component 10 is applicable to K-6; the concepts in Components 11 and 12 are better suited for grades 2-6.

SECTION IV: Soil Productivity in Minnesota

Activities in this section will begin to apply the soil concepts to land in Minnesota. Students in grades 5-6 will examine where crops are grown in Minnesota, the ways to prevent soil erosion, and the relationship between food production and disappearing Minnesota farmland.

SECTION V: Planning for Wise Use of Land

Activities in this section are designed to provide students in K-6 with the basic concept of the necessity to use land wisely. Component 16 provides K-3 students with the understanding of the need to use land wisely. Component 17 allows students in grades 4-6 to focus on appropriate uses for various kinds of land. and Component 18 offers the opportunity for grade 6 students to role-play decision-making in a land use simulation.

SECTION VI: Soil Conservation and Preservation

Activities in this section will offer students in grades 4-6 the opportunity to consider ways to conserve and preserve the soil as alnd use development proceeds.

SECTION VII: LAND UTILIZATION: World Food Needs

Activities in this section will allow students to explore the causes of hunger and identify the hungry people in the U.S.A.

Because of the complexity of these concepts this section is best taught to grade 6, yet with some modifications, students in grades 4-5 could benefit from the activities.

Organization of Each Activity

Each activity includes a brief description of the instructional method employed; background information for the instructor; a list of any materials needed; step by step procedures; indication of tecommended grade level; subjects from which concepts are drawn; skills; duration; recommended group size; setting (indoors or outdoors); and key vocabulary. In every case, an instructor is encouraged to adapt activities for different ages, subjects, skills, group sizes, etc. Finally, each activity includes a listing of points in the Curriculum Framework outline to which the activity either corresponds directly, i.e. the activity is designed to teach the concepts specifically; or, indirectly, i.e. the points noted are useful additional background information for the instructor.

Appendices

The Appendices include the Curriculum Framework in outline form, an Illustrated Vocabulary, Resource Guide; Activities by grade and subject area; and Cross-Reference by skills.

The **RESOURCE GUIDE** is further broken down into sections for easy application. The Resource Personnel section lists county and state level personnel in Agricultural Extension, planning, soil conservation, and soil and water conservation services.

Recommended Reference Material, which is also found in the **RESOURCE GUIDE**, contains lists of references for students: computer discs, educational cartoon booklets, material provided by the Forest Service, films, magazines and books. Other available curriculum packets and materials for teacher background is also included.

TABLE OF CONTENTS

Preface v
Introduction vi
Rationale vii
How To Use This Book ix
Table of Contents xi

SECTION ONE:
WHAT IS SOIL (Feel it, See it)?

Component 1 Soil Types (K-6)
Component 2 Plants Need Soil and/or Water (K-6)
Component 3 Who Needs Soil? (K-2)

SECTION TWO:
RELATIONSHIP OF SOIL TO WIND AND WATER

Component 4 Compare How Much Moisture Different Soil Hold (K-6)
Component 5 Running Water and Walking Water (K-2)
Component 6 How Do People Change Soil? (K-2)
Component 7 Water: Where It Comes From, Where It's Going (5-6)
Component 8 Soil Is Lost by Water Erosion (4-6)
Component 9 Soil Is Lost by Wind Erosion (K-6)

SECTION THREE:
RELATIONSHIP OF SOIL TO PLANTS

Component 10 Compare Soils by Growing Plants (K-6)
Component 11 Healthy Roots are Important (2-6)
Component 12 Happy Soil, Sad Soil (3-6)

SECTION FOUR:
SOIL PRODUCTIVITY IN MINNESOTA

Component 13 Minnesota's Soil Produces Much Food (5-6)
Component 14 Dirt, Who Needs It? (5-6)
Component 15 Disappearing Farmland in Minnesota (5-6)

SECTION FIVE:
PLANNING FOR WISE USE OF LAND

Component 16 Farmland Is Lost (K-3)
Component 17 You've Got Me Covered (4-6)
Component 18 Land Use; Whose Responsibility? (6)

SECTION SIX:
SOIL CONSERVATION AND PRESERVATION

Component 19 Soil Must Be Protected (4-6)
Component 20 Everything In Its Place (4-6)

SECTION SEVEN:
LAND UTILIZATION: WORLD FOOD NEEDS

Component 21 Why Are People Hungry? (6)
Component 22 Who's Hungry In the USA? (6)

APPENDICES

Curriculum Framework 1
Illustrated Vocabulary 11
Resource Guide ....
  Resource Personnel
    Agricultural Extension Service (4H) by counties 20
    Community Colleges (Campuses offering agricultural programs .. 24
    Department of Natural Resources Regional Offices 25
    Minnesota Development Regions 26
    Minnesota Pollution Control Agencies 27
    Minnesota State Association of County Planning and Zoning Administrators 28
    Minnesota Vocational Agriculture Departments in High Schools and Vocational Schools 31
    Resource Conservation and Development Offices 47
    Regional Soil and Water Conservation Offices 48
    Soil Conservation Service by counties 49
    Soil and Water Conservation Districts by counties 53
    University of Minnesota (Campuses offering agricultural programs 57
    Other Resource Organizations 57

  Recommended Reference Material
    Ag-Stravaganza Material 59
    Computer Discs 59
    Education Cartoon Booklets 60
    Forest Service of the U.S. Department of Agriculture 61
    Films 63
    Magazines and Books 67
    Model Farm Sites 69
    Other Curriculum Packets 70
    References for Teachers 75

Activities by Grade 86
Activities by Subject 88
Cross Reference by Skills 89
Acknowledgements 93

SECTION

WHAT IS SOIL?

ACTIVITIES

- Feel and See Soil Differences
- Plant In Soil and/or Water

DID YOU KNOW

In Minnesota We Cover Up More Than
100 Acres Of Soil Every Day
(That is more than 100 football fields)

Tons of Topsoil Are Lost Each Year
By Wind Erosion . . . By Water Erosion

Governor's Council on Rural Development

GCRD

SECTION 1

TEACHING PACKET

WHAT IS SOIL (Feel It, See It)?

COMPONENT 1	Soil Types (K-6)
COMPONENT 2	Plants Need Soil and/or Water (K-6)
COMPONENT 3	Who Needs Soil? (K-2)

SOIL TYPES

AGE: Grades K-6
SUBJECT: Science
SKILLS: Analysis, classification, comparison and contrast, generalization, observation
DURATION: 20 minutes
GROUP SIZE: Classroom
SETTING: Indoors or outdoors
KEY VOCABULARY: Clay soil, loam soil, organic matter, sandy soil. See Illustrated Vocabulary.
LEARNING PACKET: Activity Sheets A and B

Description

The children will see and feel three kinds of soil.

Learner Objective

Students will be able to identify soil differences through touching, seeing, and hearing.

Background

See Curriculum Framework I, page 1.

Soil scientists have identified over 10,000 kinds of soul. Three basic kinds are clay soil, sandy soil, and loam soil.

Clay soil is very fine. Sandy soil has larger particles and feels gritty. Loam soil is a mixture of sand and clay, along with organic matter. Loam is usually black. Organic matter gives loam its color.

Materials

- Plastic pail of sandy soil
- Plastic pail of clay soil
- Plastic pail of loam soil
- Mask to cover eyes
- One empty plastic pail
- Component 1 Activity Sheets A and B from Learning Packet

Activity

1. Display the three pails of soil. Ask the children to contrast the three soil samples. There are many kinds of soil. Today we will talk about three kinds.
2. Allow students to feel the three kinds. In turn, blind-fold children or use masks and let them drop their hands into the three plastic pails of soil. Identify the soil. Students record their names on Component 1 Activity Sheet A when they correctly identify soils. Included in the Learning Packet is Component 1 Activity Sheet B, a matching sheet for K students.
3. Demonstrate how soil scientists detect clay content in soil. Moisten each sample and roll into a small ball. Squeeze each ball between your thumb and forefinger. Your findings should be similar to the following:

Loam Soil - Easy to crumble (because it contains organic matter). Loose.
Sandy Soil - Runs through fingers. Some feels like it has rocks in it. Brown, slippery, gritty.

Clay Soil - Will ribbon like tooth-paste when moistened and squeezed between thumb and forefinger. Hard to crumble if dry. Lumpy when crumbled.

4. Pour each kind of soil into another pail. Listen. How do they sound?

Evaluation

Given three soil samples, students will be able to detect differences in the composition, color, and sound as the soil is poured into another pail.

Extended Activities

1. Place three different kinds of soil (loam soil, sandy soil, clay soil) into a jar and fill with water. Shake the jar. Watch the layers settle. Which soil is the heaviest? lightest?
2. Put small stones and water into a plastic container. Fill one-third with small stones and remainder with water. Shake 1000 times. Children could take turns. Watch the wearing away of stones as it begins to form soil.

   Or use three jars of small stones and water. Shake jar one 200 times. Shake jar two 1000 times. Do not shake jar three. Note the differences in soil formation.
3. Allow fifteen minutes to walk the class around the school-yard to view areas where children could see: sand, gravel, grass, trees, asphalt, etc.

   Is all soil alike? Is asphalt soil? What is under asphalt? Where do we find soil? Is gravel soil? Why doesn't grass grow on asphalt?
4. Spread out large garbage bags on a table that can be used as a display for several days. Have children make mud pies from sandy soil, clay soil and loam soil. Leave them on the table for a few days until they are dry. Which mud pie fell apart? Which mud pie stayed in a pie shape? Are all soils the same?
5. Have the children make a picture of soil that doesn't use words. They can draw, sketch, or make a collage that shows what soil is and also tells how they feel about soil.
6. Children can examine a variety of soil samples using hand lenses or magnifying glasses. Make certain that they notice that the soils are composed of mixtures of different kinds of particles. Then sift clay soil, loam soil and sandy soil to see how fine the particles are.

PLANTS NEED SOIL AND/OR WATER

AGE: Grades K-3
SUBJECT: Science
SKILLS: Comparison and contrast, evaluation, generalization, observation, visualization
DURATION: 15 minutes
GROUP SIZE: Any
SETTING: Indoor or other
KEY VOCABULARY: Nutrients. See Illustrated Vocabulary.
LEARNING PACKET: Activity Sheet

Description

The children will plant seeds under varying conditions.

Learner Objectives

Students will be able to understand where plants are able to grow because soil, water, sunlight, and air are available.

Background

See Curriculum Framework I, page 1 and Curriculum Framework III, page 3.

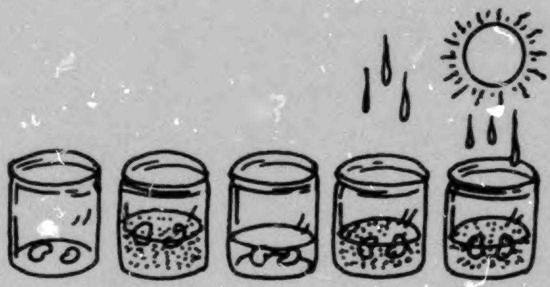
The soil provides a place for roots to anchor the plant. The ends of the roots absorb moisture and nutrients from the soil. The moisture combines with carbon and the sun's rays in the leaves to manufacture food.

Plants need soil, moisture, sunlight and air to grow. Soil that is loose also contains air for the plants.

Materials

- 10 lima beans (Soak them overnight in water at room temperature.)
- 5 small jars
- Soil
- Water
- Component 2 Activity Sheet from Learning Packet

Activity



1. Remind children that all living things need soil. Ask them if living things need anything else to grow? (water, sunlight, soil and air)
2. Place the lima beans in different jars. As you plant the seeds, be sure each jar is appropriately labeled. Jar one should contain two beans and air. Jar two should contain two beans planted in dry soil. Jar three should contain two beans in water only. Jar four should contain two beans in soil that will be watered; this jar should be kept in a dark place.

BEST COPY AVAILABLE

Jar five should contain two beans in soil that will be watered; this jar should be kept where it will receive sunlight.

3. Over the next few weeks check each day to see what happens to each of the seeds. To best view the growth of the seeds, plant beans close to the side of each jar.
4. Children can record the growth of the seeds by drawing pictures of what they see in the jars at appropriate intervals. Use Component 2 Activity Sheet.

Evaluation

Given five different environments for plant growth, students will record the growth of seeds by drawing pictures of what they see.

Extended Activity

The children will walk around the school yard to observe where plants can and can't grow. Include dry areas (under leaves and overhangs of building), trampled areas, graveled sites, lush areas, sidewalk, playground, parking lot. What would plants need to grow here? Why do plants like, or not like, this area? If you were a plant, would you like to live here? Why?

Notice where weeds or grass grow on the sidewalk, playground, parking lot, etc. Where is the only place where we see any grass or weeds growing? (in the cracks). Why can't they grow on the playground or sidewalk? (need soil to grow).

Let children vote on the best area in the school yard for plants to grow and live. Plant a bulb or some seeds in that area and watch for signs of growth. If the plant does not grow well, ask the children why. Through questions and discussions, help children realize that different kinds of plants prefer different conditions, but that they share the need for at least some water, air, soil, and light.

WHO NEEDS SOIL?

AGE: K-2
SUBJECT: Science, Art, Language Arts
SKILLS: Analysis, classification, description, discussion, drawing, generalization, observation, reporting
DURATION: 20 minutes
GROUP SIZE: Any
SETTING: Indoor and outdoor
KEY VOCABULARY: Food chain. See Illustrated Vocabulary.
LEARNING PACKET: Activity Sheet
SOURCE: Story - Project L.I.F.E. - Learning in Familiar Environments - U.S.D.A. Soil Conservation Service

Description

The children will walk outdoors to look for living things. They will create a chart connecting these things with the soil.

Learner Objective

Students will be able to demonstrate knowledge indicating that soil is needed by all living things, including people.

Background

See Curriculum Framework I, page 1.

Soil is essential; it provides the basics of life--food, fiber for clothing, and shelter. In the last few years, there has been a growing concern over the loss of soil.

Materials

- Small cards
- Pencils
- Masking tape
- Soil illustration (large mound of soil - a simple hill with a tree and a large expanse of sky)
- Component 3 Activity Sheet from Learning Packet

Activity

1. Divide the class into small groups if helpers are available (Fifth and sixth graders could help with this activity.)
2. As the children walk around the school grounds, have them name the living things that they see (leaves, grass, berries, moles, trees, bugs, worms, bees, birds, flowers, etc.). The leader of each group should sketch and label on small separate cards as children find the living things.
3. After the walk is completed, return to the classroom and sit in front of a simple soil illustration. It should be a large mound of soil - a hill with one tree and a large expanse of sky.

4. As the teacher holds up each picture card, the children volunteer to tell if the thing depicted needs soil. When the group agrees it does need soil, the card is taped to the board and a line drawn to the mound. Continue until all the items are attached to the mound. Finally, add a card picturing boys and girls. As the group observes all the lines leading to the soil, guide discussion to students' decision that soil is important to all living things, including people.
5. Complete Component 3 Activity Sheet in Learning Packet.

Evaluation

Given evidence (walk around school grounds and pictures), students will draw pictures of living things that need soil.

Recommended Reference Material

1. Food for America - FFA Tells the Story (K-3 booklet with dittos that introduce the story of food to children. To order, see RESOURCE GUIDE, page 70.
2. Ranger Rithmetic for First-Second Grade Teachers (A teaching aid illustrating 24 arithmetic problems, all dealing with forest conservation). To order, see RESOURCE GUIDE, page 61.
3. All About Illinois Farms (A color and fun book, grades 2,3.) To order, see RESOURCE GUIDE, page 67.

Extended Activities

1. Engage children in a food chain - from the food on their tables, through all the processes, and back to the soil. (Production, processing, transportation, marketing, preparation.)
2. Take the children for a walk outside. Look for things that are alive. Then seat the class in a circle. Ask each child to share with the class the name of something he/she saw on the walk and tell whether it is alive, or not alive.

What do you think would happen if all of these things that are alive didn't have soil to stand on, dig in, hide in, or eat?

Ask the children to pretend what it would be like if all of the soil underneath them suddenly disappeared. Instead of being people, they should pretend to be some other living thing that they saw on their walk in the schoolyard. The teacher could use a "magic" paintbrush painting each child into something different that's living. (Example: Tommy, I'm going to paint you into a tree; Mary, you're a bird in its nest in a tree.) What are some animals that might live here that we didn't see on our walk? (Earthworm, mole, ant, rabbit, squirrel, chipmunk, slug, etc.) Continue to assign a different role to each child. Ask the children to remember their new role as they LISTEN to the following story.

"It's a sunny day and there's no wind blowing. All you plants, dig your roots into the soil and feel how soft and warm it is. You ants are busy digging new homes in the soil. You bunnies are digging up some fresh orange carrots that are growing near by. You birds are pulling up worms, etc. Think about how you are using the soil. Is it important to you? What if there weren't any soil? What would you do?

"Suddenly, you feel the earth beginning to shake. I am going to take out my magic paintbrush and paint myself into a giant bulldozer. As I rumble along, I push all the dirt out of my way. I'm going to build myself a big road right here.

What's happening to all the living things that need the soil? What are they to do? As I rumble by, what happens to the trees? What about the bird in the tree? Where do they go? What can they do to live and eat"?

Read the story again allowing the children to react to their "painted" roles. Have the children sit in a sharing circle. Ask each child what happened to their living thing when the soil disappeared. How did they feel?

Guide the discussion toward the conclusion that living things need and depend upon soil for food, shelter, and support.

Draw a picture of what you were before and/or after the bulldozer.

SECTION 1

LEARNING PACKET

WHAT IS SOIL (Feel It, See It)?

COMPONENT 1 Soil Types (K-6)
COMPONENT 2 Plants Need Soil and/or Water (K-6)
COMPONENT 3 Who Needs Soil? (K-2)

COMPONENT 1
ACTIVITY SHEET A

SOIL TYPES

LEARNER OBJECTIVE:
Students will be able to identify soil differences through touching, seeing, and hearing.

CHART

LOAM SOIL	SANDY SOIL	CLAY SOIL

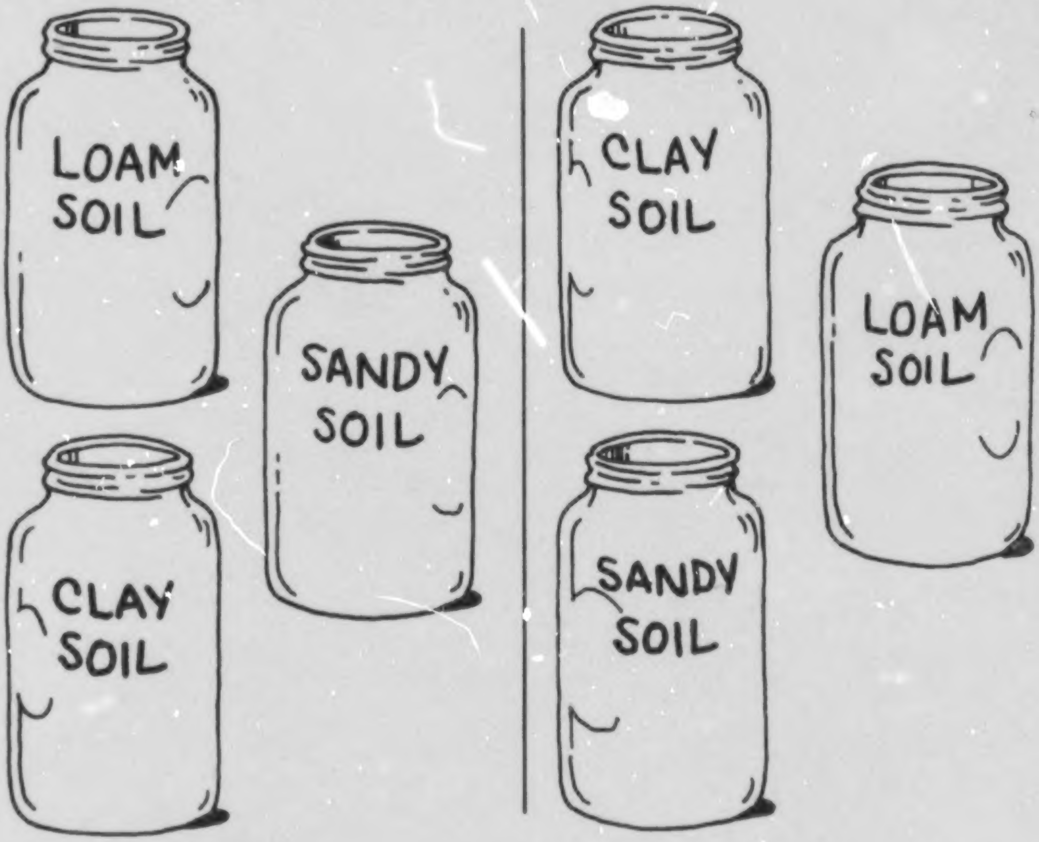
COMPONENT 1
ACTIVITY SHEET B

SOIL TYPES

LEARNER OBJECTIVE:

`Students will be able to identify soil differences through touching, seeing, and hearing.`

Color the loam soil black. Color the sandy soil brown. Color the clay soil tan.


LOAM SOIL
SANDY SOIL
CLAY SOIL
CLAY SOIL
LOAM SOIL
SANDY SOIL

Now look at the picture in the first column. Match it with the picture in the second column by drawing a line.

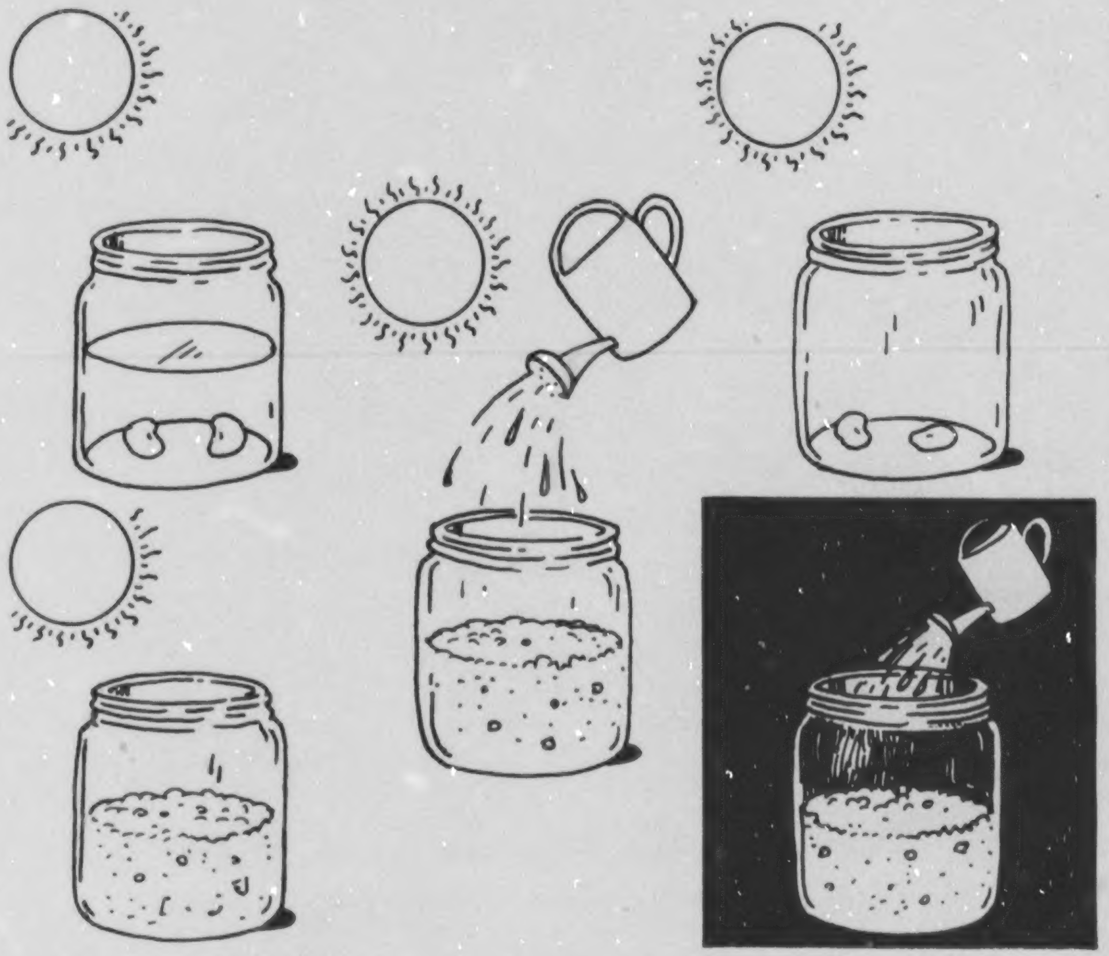
COMPONENT 2
ACTIVITY SHEET

PLANTS NEED SOIL AND/OR WATER

LEARNER OBJECTIVE:

Students will be able to understand where plants are able to grow because soil, water, sunlight, and air are available.

Record the growth of the seeds by drawing pictures of what you see in the jars.



BEST COPY AVAILABLE

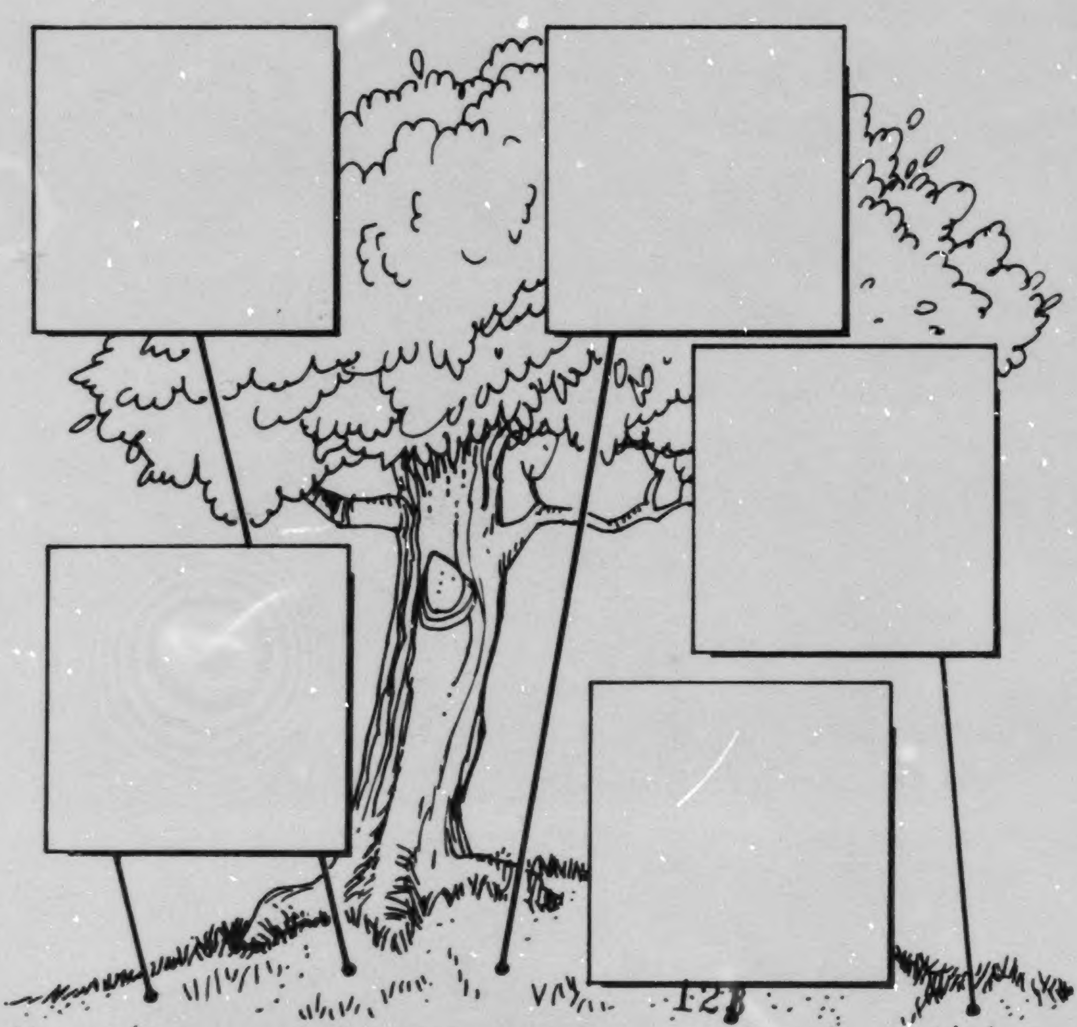
COMPONENT 3
ACTIVITY SHEET

WHO NEEDS SOIL?

LEARNER OBJECTIVE:

Students will be able to demonstrate knowledge indicating that soil is needed by all living things, including people.

In the boxes, draw pictures of living things that need soil.



SECTION 2

RELATIONSHIP OF SOIL TO WIND AND WATER

ACTIVITIES

- Moisture In Soils
- Water Erosion Demonstrations
- Wind Erosion Demonstrations

DID YOU KNOW

Minnesota is

LOSING SOIL

So Fast . . . Too Fast

HOW?

Through Wind Erosion
and Water Erosion

Governor's Council on Rural Development

GCRD

BEST COPY AVAILABLE

SECTION 2
TEACHING PACKET

RELATIONSHIP OF SOIL TO WIND AND WATER

COMPONENT 4	Compare How Much Moisture Different Soils Hold (K-6)
COMPONENT 5	Running Water and Walking Water (K-2)
COMPONENT 6	How Do People Change Soil? (K-2)
COMPONENT 7	Water: Where It Comes From, Where It's Going (5-6)
COMPONENT 8	Soil is Lost by Water Erosion (4-6)
COMPONENT 9	Soil is Lost by Wind Erosion (K-6)

BEST COPY AVAILABLE

COMPARE HOW MUCH MOISTURE DIFFERENT SOILS HOLD

AGE: K-6
SUBJECT: Science
SKILLS: Analysis, application, classification, comparison and contrast, evaluation, generalization, observation
DURATION: 15 minutes
GROUP SIZE: Any
SETTING: Indoor or outdoor
KEY VOCABULARY: Clay soil, loam soil, percolation, sandy soil. See Illustrated Vocabulary.
LEARNING PACKET: Activity Sheet

Description

The children will observe how water enters different kinds of soils.

Learner Objective

Students will be able to analyze how water enters different soils, how readily it passes through, and how much is held.

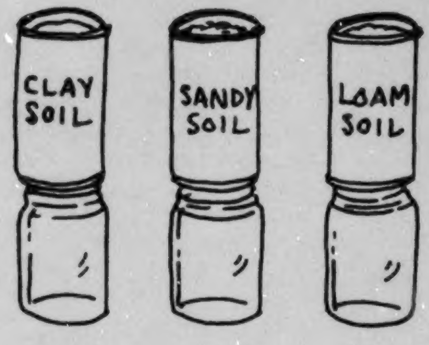
Background

See Curriculum Framework I, page 1 and Curriculum Framework II, pages 2 and 3.

Rate of water movement through the soil is important. If water moves through soil too fast, it drains away before plants can use it. On the other hand, if percolation is too slow, water will run off down hill before it has time to soak into the soil, thus leaving plants without any water again. Soil perc time is usually determined by soil texture (the size of soil particles).

Materials

- Pint of clay
- Pint of sand
- Pint of loam
- Newspaper
- 3 frozen-fruit juice cans
- 3 baby food jars
- Component 4 Activity Sheet from Learning Packet
- Thin nail, hammer, water, measuring cup, paper towel
- Flour sifter



Activity

1. Spread each sample of soil, (clay soil, sand soil, loam soil) separately on a newspaper and leave them until all feel dry to the touch. Two or three days should be long

BEST COPY AVAILABLE

enough if you stir the soils occasionally. Sift the soil samples to be used in class.

2. With a nail, punch five holes in the bottom of each frozen-fruit juice cans.
3. Cut a circle of paper towel to fit the bottom to each can. Put these inside the cans to keep the soil from dropping through the holes.
4. Fill each can one-third full. Pack clay soil in one, sandy soil in the second, and loam soil in the third.
5. Place the cans on the baby food jars.
6. Using a measuring cup, pour one-fourth cup of water on the soil in the first can. Record the information on the chart found on Component 4 Activity Sheet.
7. Repeat for each can. You may want to do all three concurrently, appointing a committee of time-keepers for each.
8. Discuss the permeability results with the children. Which soil did the water enter most quickly? Through which soil did water pass most rapidly? Most slowly? Which soil let the most water through? Which soil held the most water?

   What do you think would happen to plants growing in each soil in a very dry summer? In a wet summer season?

   Why would areas covered by asphalt and cement (Parking lots, shopping centers, residential areas) be more likely to flood than open areas?

Evaluation

Given a demonstration, students will record the permeability results for each type of soil.

Extended Activity

Use a variety of surfaces to test its capability of absorbing water.

Sprinkle water on:

1. sponge
2. piece of wood
3. cloth
4. plastic
5. paper
6. soil

Discuss the results with the children.

RUNNING WATER AND WALKING WATER

AGE: Grades K-2
SUBJECT: Science
SKILLS: Analysis, discussion, drawing, evaluation, generalization, observation
DURATION: 20 minutes
GROUP SIZE: Any
KEY VOCABULARY: Erosion, fertility, topsoil, water erosion. See Illustrated Vocabulary.
LEARNING PACKET: Activity Sheet
SOURCE: Science Discovery Achievement Activities, by Robert Doan

Description

Children will observe the effects of simulated rain on a mound of soil.

Learner Objective

Students will be able to demonstrate knowledge of how moving water moves soil.

Background

See Curriculum Framework II, pages 2 and 3.

Water can have either positive or negative effects on soil. Soil needs water if plants, trees, and grass are to grow. Any type of soil cover such as grass, trees, and plants, stops the rain so it can soak into the soil. When it rains hard, and there is no cover on the soil, the soil is carried away by the water. Good topsoil is only eight inches deep; it is irreplaceable. So when it washes away, this is a tragic loss. Eroded soil also loses fertility.

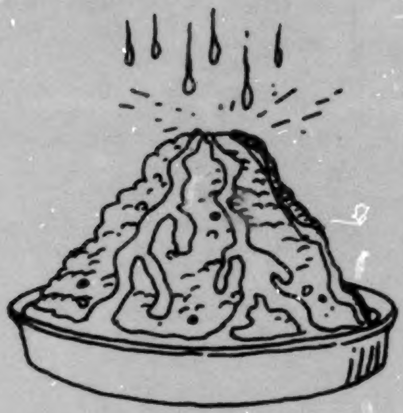
Water, when it runs fast, damages the soil. Water, when it walks, can be absorbed and give life to plants and trees, which in turn provide life to animals and people.

Materials

- Two quarts of moist soil
- Cake pan
- Sprinkling can of water
- Grass clipping (quart milk container)

Activity

1. Gather the children in a central location where all can see the demonstration. First introduce a new word to them - erosion. Erosion happens when water runs. They will see what running water does. Then they will try to figure out what they can do to help the running water to become walking water.
2. Next, prepare a small model hill by making a mound of soil on the cake pan. When all the children understand that the mound represents a real hill and the sprinkling can will simulate rain, pour water gently from the sprinkling can over the mound of soil. Then simulate a harder rain.



Note how the soil is washed down the mound. What happened to the soil? When does the water "walk" down the mount of soil? When does the water "run" down the mound of soil? What could be done to prevent the soil from running away when it rains?

3. Now cover the mound of soil with grass clippings and simulate gentle rain and then a harder rain. What happened to the soil? When does the water "walk" down the mound of soil? Does the water "run" down the mound of soil? Do the grass clippings help to prevent the soil from running away when it rains.
4. What happens to soil on a hillside when it rains? What if it rains softly? What happens to the hillside when it rains harder? Can you think of examples of erosion in our own neighborhood?
5. Using Component 5 Activity Sheet, have the children draw pictures showing "running" and "walking" water.

Evaluation

Given a demonstration, students will draw pictures to indicate characteristics of "running" water and "walking" water.

Extended Activities

1. Take the children to a paved area. With a sprinkling can, produce "rain" on the pavement. Note the splash.

   When is a grassy area, produce "rain" again. Note the splash.

   The best way for children to observe the differences is to have the paved and grassy areas adjacent to each other.

   Why is there less splash on the grass than on the pavement? (Grass catches the rain and allows it to soak into the ground.)

   Why is there a bigger splash on the pavement? What happens to the rain? (The rain can't soak in - no soil.)

   If appropriate for your group, relate this observation to possibilities of flooding.
2. Have the children form one big circle. They will represent seeds and wheat. One child, standing in the middle, will represent the sun. Several children, representing raindrops, will be outside the circle. And several children inside the circle will be farmers.

   "The Farmer and the Dell" melody.

   1) The farmer tills the fields... (plowing motion)
   2) The farmer plants the seeds... (Farmers tap seeds. Children sit down as they are tapped.)
   3) The rain begins to fall... (Raindrops run around the outside of the circle.)
   4) The clouds roll away...
   5) The sun begins to shine... (The sun dances inside the circle.)
   6) The seeds begin to grow... (Seeds stand up.)
   7) The farmer cuts the wheat... (The seeds stoop down as farmers dramatize.)
   8) The farmer combines the wheat... (Farmers place wheat back to back.)
   9) The farmer's work is done... (The farmers skip between the children.)
   10) We all jump for joy... (All dance.)

BEST COPY AVAILABLE

HOW DO PEOPLE CHANGE SOIL?

AGE: K-2
SUBJECT: Art, Language Arts, Science, Social Studies
SKILLS: Analysis, comparison and contrast, description, discussion, generalization, observation, visualization
DURATION: 20-30 minutes
GROUP SIZE: Any
SETTING: Outdoors
KEY VOCABULARY: Compacted soil. See Illustrated Vocabulary.
LEARNING PACKET: Activity Sheet
SOURCE: Project L.I.F.E. - Learning in Familiar Environments - USDA Soil Conservation Service

Description

The children will study paths: the result of one way people affect soil.

Learner Objective

Students will be able to analyze how the habits and practices of people affect the soil and growth of plants.

Background

See Curriculum Framework III, page 3.

Plant roots need breathing space and moving space to grow. When this space is compacted by feet, motorcycles, or cars, plant roots cannot grow. Roots help to prevent water and wind erosion.

Materials

- Assortment of magazine pictures illustrating the concept of how people change soil in the process of using it. (One or more for each child.) Such pictures might include earth movers working, buildings being built, a flower or vegetable garden, an orchard, a campground, a burned forest, a swimming pool, etc.
- Component 6 Activity Sheet from Learning Packet

Activity

Before the children go home the day prior to this activity, ask them to look for paths in the neighborhood.

1. Hold class discussion concerning what paths were found. Where did the paths come from? Then go outside and see where paths are located on the schoolground.
2. Lead the group around the school area. Look for paths. Are they well established? Just starting? Can you tell?
3. Choose paths for study. Have children try to dig some soil from the paths. Is it hard? Is is dusty? If the paths were not here, what would be in their places? Where did the plants go that are used to grow where the paths are now?
4. Look beside the paths. Try to dig up some soil under the plants there. Compare the soils on the paths and beside the paths. What differences do you see?

5. What will these paths look like next year? In five years? What will wind to to them? Rain and snow? What do your feet do to them? What would an army of feet do to them? What would a motorcycle do to them?
6. How could we remove these paths? Do we want to? Should some paths be saved? Should we decide what paths around our schoolyard could be eliminated? How can we help erase them? What do we want in their places?
7. Paths are small. Roads are much bigger. What do you think the soil under the roads is like? Do you think it is happy soil or sad soil? Why? Can roads ever be eliminated?
8. Place pictures in a box and ask children to choose one at a time. Then have them tell how people are changing or using the soil in this picture. Each child will choose a favorite picture to paste as an illustration for a story page. The child will write or dictate several story sentences which describe how people are changing the soil. The stories could be displayed on a bulletin board or compiled into a class booklet. Children will be developing a basic awareness that people change soil as they use it.
9. Using Component 6 Activity Sheet, children will draw places where plants can grow and places where plants cannot grow.

Evaluation

Given an opportunity to observe pathways, students will draw pictures indicating where plants can grow and cannot grow.

WATER: WHERE IT COMES FROM, WHERE IT'S GOING

AGE: Grades 5-6
SUBJECT: Science, Social Studies
SKILLS: Analysis, application comparison and contrast, description, drawing, evaluation, generalization, inference, mapping observation, problem solving, reporting, research, synthesis, visualization, mapping
DURATION: 3 to 4 hours, not counting the data collection
GROUP SIZE: Large group and small group
SETTING: Outdoors
KEY VOCABULARY: Contaminate, divide, drainage area, evaporation, groundwater infiltration, pollutants, precipitation seepage, septic tanks, springs, surface runoff, textile waste, transpiration in plants, tributary, water cycle, watershed, watertable. See Illustrated Vocabulary.
LEARNING PACKET: Activity Sheet
SOURCE: "Whirligigs" - U.S. Fish and Wildlife Service

Description

Students will gather information about local watersheds and drainage areas from local resource people and transfer this information to maps.

Learner Objective

Students will be able to identify local watersheds and drainage areas by using maps and gathering information from local resource people.

Background

See Curriculum Framework I, page 1 and Curriculum Framework II, pages 2 and 3.

Much of our precipitation evaporates back into the atmosphere before any flow into streams or lakes is possible.

The rest of the rain and snow falls into a watershed or drainage area and eventually finds its way into lakes and streams, and eventually to the ocean. Water may run over the surface of the land and into small creeks or rivers that feed a lake. Most, however, soaks into the soil to become part of the groundwater under the earth's surface.

The water table is the upper level of the groundwater. When the water table or groundwater level falls, the lake level also will fall. The major factors influencing lake levels are the amount of precipitation and the balance between the inflow and outflow of water.

This water cycle can be severely altered, especially in urban areas, by any change in land use. Changes include: removing vegetation, building houses, driveways, etc. - all which reduce the soil's ability to hold water.

Because these structures do not allow water to soak into the ground, the water runs off into sewers or streams and may cause flooding and eventually decreases available groundwater. This could affect homes which get their water from groundwater wells.

Run-off also can pick up pollutants (oil and garbage from streets) and contaminate groundwater through infiltration and seepage. Thus, water pollution in one site or a general area can affect water quality in a distant location. Not only people are affected, but also fish, wildlife, and many other parts of our natural world.

Materials

For the group:

- A United States map showing major watersheds. (A good map of this type is available from your county Agricultural Extension Service agent.)
- A highway map of your state
- A county map, or even a more local map. (Call your county courthouse for information on what maps exist and how to acquire them.)
- Topographical maps of your locality are available from the United States Geological Survey, 1200 South Eads Street, Arlington, VA 22202.
- Large sheets of newsprint or butcher paper to make a map approximately 5' x 10'
- Felt-tip markers, crayons, or chalk in several colors
- Small gummed stickers

For each student:

- Notebook and pencil
- Diagrams of watershed and water cycle. (Component 7 Activity Sheet from Learning Packet.)
- Scratch sheets for practice mapping

Activity

1. Distribute copies of the water cycle and watershed to each student. (See Learning Packet Component 7 Activity Sheet.) Explain each one. Students can make notes on their diagrams as the explanation progresses.

   Watershed refers to a land area within which all water flows toward the lowest point. Small streams flow into larger streams, which flow into rivers which eventually reach an ocean. In this passage, water moves through marshes, ponds, lakes, and even those wetlands that appear to be motionless.

   The term watershed applies to the total land area drained by each of the major rivers in the country; it also applies to the land area drained by each smaller river and stream, even though those rivers and streams are parts of the large rivers' drainage areas.

   The term water water cycle means using the earth's water over and over again. The sun is the source of energy. The sun heats the oceans causing vapor to rise into the atmosphere. There, droplets combine with other droplets as they cool, and eventually they are heavy enough to fall to earth as rain or snow.

   Some moisture is absorbed by plants which put moisture back into the atmosphere by means of transpiration. Some moisture collects in wetlands and waterways, and eventually makes its way back to an ocean. The earth and its atmosphere is like a sealed capsule; it is creating no new water. The quantity of water is always the same. The quality of the water might vary.

Contact the County Agricultural Extension Agent if you would like a class speaker on watersheds or the role of the water cycle in nature. Or contact the Minnesota Pollution Control Agency if you would like a speaker on water.

2. Explain that the students are going to discover for themselves where water exists in their community, where it comes from, and where it goes. Explain that they are going to observe, record their observation, and transfer their information to a large mural map which will show the water-movement portrait of their own small piece of the North American continent.

Examine a map of the United States showing major watersheds. Ask students to pinpoint the major watershed in which they live. In a general way, trace where their own water goes.

Examine a map of your state and pick out the major rivers. In which direction does each one flow? Which are the larger tributaries of each major river and the smaller tributaries of each of those? Take a felt-tip marker and draw the boundaries of each major river's watershed as accurately as you can. Explain what a divide is and ask students to pinpoint the watershed in which they live on the state map.

Examine a map of your county. Relate it to the map of your state and of the United States so as to place it in its major watershed context. Find the important rivers and streams. To which major watershed do they belong? Which direction do they flow? How does water supply relate to where cities are located?

3. Tape the large sheets of paper together into a shape that approximates the proportions of the school community/district. Using all the maps that are useful, have the students transfer onto the paper: all major highways, roads, lakes, rivers, streams, and marshes. Pencil lightly first, and check accuracy before applying permanent color. Choose which colors you'll use for which features, and make a key in a lower corner. NOTE: Start by drawing highways and roads first. This will make it easier to place odd-shaped bodies of water in their correct locations.

4. Ask each student to write his/her name on a small gummed sticker, and place the sticker on the map in the position of his/her home. Divide the map into four equal parts or guadrants, and divide the students into four teams determined by where each lives.

5. Each team will have two or three days to observe, describe, and sketch on scratch paper any water bodies, streams, or drainage ditches, ponds or marshes too small to be on the state or county maps. Observations can be made from the school bus, in walking to and from home, and by asking people in the community. Transfer all the new data to the mural map until it is as complete as possible.

6. Discuss:
   - What direction does water move in this community? How can you tell?
   - How can you tell that water moves through a lake or a marsh? What is your evidence? Do you have a place in your community where you can find this evidence?

- Generally speaking, how fast does your water move? What does that tell you about the land surface around you?
- Generally speaking, what size are your waterways? Does that give you an idea of how near or how far you are from the outer edge of your watershed?

7. Review what the students know about waterways and direction of flow. Then pretend your finger is a drop of water and place it at random on the map. Give each team ten minutes to get a drop of water out of their quadrant. They will move it in the direction they know it must go through the water bodies they have mapped. Do this with a felt-tip marker on a transparent plastic overlay such as a 4 mil drop cloth available at a local hardware store.

Evaluation

Given data, students will draw a mural indicating where local watersheds and drainage areas are located.

Extended Activities

1. Students might imagine that they are drops of water and write the story of their journey across their watershed to a major river.
2. A trip could be planned to the County Historical Museum to look at earlier maps of the county. These would show changes of many kinds in waterways and wetlands. The director of the museum could talk about the changes and could also find letters, diaries, photographs, and news articles making reference to lakes, rivers, and marshes. Students could get an idea of how early residents used their waters, how they valued their waters and anecdotes of events involving their waters. Discuss changes today and hypothesize on sources of pollution in your watershed. Are these sources necessary for society to gain some other benefit? What would farming be like without fertilizers, pesticides and irrigation? What would urban life be like without streets and sewers?

   If a trip isn't practical, a person from the museum staff could come to the classroom.
3. A topographic map from the United States Geological Service would provide gradations of slope. For students with the interest and skill, a topographic map would make possible a more precise understanding of direction(s) and speed of waterflow in their part of the watershed.
4. On the poster, you can see a variety of land uses in the watershed area. How might logging, mining, forest fires, or a subdivision of homes affect the area? How might each one affect organisms living in the watershed?
5. Students might enjoy keeping a journal of one water area on the map. Have them observe the area on a regular basis and record their observations during the school year.
6. Ask the students to study the school building as the beginning of a watershed. The best time to observe is after a rain. Look at the roof from the ground. How does the roof shed water? Walk around the building and find the rain gutters. What is their role? What would happen if there were no rain gutters? Locate the downspouts. Trace the route from the roof to the rain gutters, to the downspouts, to the streets, and to the storm sewers. Students can also observe the school yard for low spots where water collects after rains, evidence of erosion, ice spots, snow melt, and puddling.

7. Plan a field trip (or take photos, slides) to a number of nearby sites where the natural water table is readily observable. For assistance in locating a variety of such sites, contact one or more of the following:

   a. U.S. Department of Agriculture Soil Conservation Service - County Office. See RESOURCE GUIDE, page 49.
   b. Minnesota State Association of County Planning and Zoning Administrators. See RESOURCE GUIDE, page 28.
   c. Agricultural Extension Service. See RESOURCE GUIDE, page 20.

   Someone from one of the above agencies may be available to guide this tour and to explain the various situations encountered.

   Water tables may be exposed in several ways. You may wish to devise a game in which students search for evidence of water tables. If possible, try to locate and visit sites such as:

   a. Springs or Seeps - These are places where the slope or hillside cuts through a saturated zone of soil or rock. Why are springs valuable? What problems do they pose for construction workers, for crop production, and for timber production? What effect do springs have on plant and animal life?
   b. Marshes or Wetlands - These are places where a shallow depression exposes a water table which is underground beneath adjacent higher slopes. What impact does heavy rainfall have on wetlands? Why doesn't the water quickly soak away when the rain stops? What problems are involved in converting wetlands to shopping centers, cropland, housing developments, or transportation corridors? What role do wetlands play in ground water supplies? What plants are found in a marsh that are not found on adjacent property? What connections do wetlands have with wildlife?

   Once students have begun to recognize evidence of water tables and their significance, challenge them to locate examples of problems caused by people's disregard for water tables. Perceptions of such problems might be displayed via art projects or language arts activities. Water table-related problems might include:

   a. Bumpy or wavy roads - roads built over areas with high water tables and/or unstable underlying soils.
   b. Smelly septic tank drain fields - placed in low lying areas where water does not filter downward through the soil due to the high water table.
   c. Flooded basements or yards - high water table will not allow normal seepage through soil profile.
   d. Garbage and toxic waste dumps - often too close to water table and ground water supplies.

   Conclude with discussion emphasizing importance of carefully considering local water tables before human activities take place.

SOIL IS LOST BY WATER EROSION

AGE: Grades 4-6
SUBJECT: Science, Social Studies
SKILLS: Application, discussion, generalization, inference, observation, visualization
DURATION: 15 minutes
GROUP SIZE: 10 students would be ideal. Possible with larger groups.
SETTING: Indoors or outdoors
KEY VOCABULARY: Chisel plow, conservation tillage, erosion crop residue, evaporation, mulch, moldboard plows, rill erosion, sheet erosion, splash erosion. See Illustrated Vocabulary.
LEARNING PACKET: Conserving Soil, Masters 10 and 11.

Description

Through rain simulation students will observe the effects of water on three kinds of fields.

Learner Objective

Students will be able to observe how water moves soil and suggest ways to prevent water erosion.

Background

See Curriculum Framework II, pages 2 and 3.

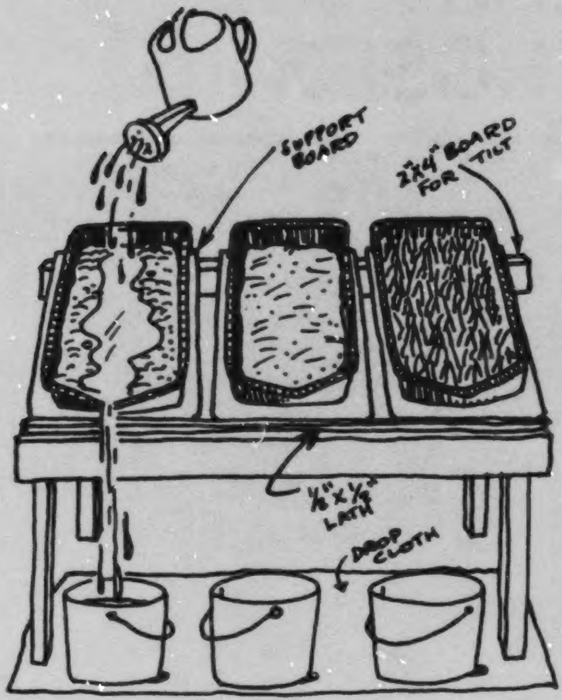
Open plowed fields are victims of water and wind erosion.

Fields where mulch or crop residue (corn stalks and husks, grain chaff) have been left as a protective covering benefit in two ways. The residue helps to collect the moisture, thereby preventing erosion. The residue also acts as a shield to prevent the evaporation of moisture from the soil. In many areas of Minnesota, farmers are beginning to use conservation tillage equipment such as chisel plows, instead of moldboard plows, to help protect the soil from wind and water erosion.

Grasses are one of the best natural means for enriching the soil and for reducing erosion because of their root and stem structure.

Materials

- U.S.D.A. Soil Conservation Service's Conserving Soil, Masters 10 and 11 in Learning Packet
- Toy quart sprinkling can
- Prepare 3 aluminum turkey roasting pans, a pan of sod or grass, a pan with crop residue (in and on top of soil), and a pan of soil (no residue, no grass cover).
- Be sure to have a board under each pan for support. On the front side of the support board, have a small wooden strip to prevent the pans from sliding when tilted. Under the opposite end of the support board, place a 2" by 4" to tilt the pans. (See diagram)
- Form a spout at the front of each pan by slightly bending the pan.
- Place a plastic pail under each spout. (Note: a large plastic bag under the pails will protect the floors from accidental spills.)



Activity

1. Point out three kinds of fields to the students. Do as much or as little instruction as is needed to explain the pan with crop residue. The toy conservation tillage equipment and booklets from local farm implement dealers would be effective teaching tools here.
2. Wet the soils in the pans so water will run off. Fill the sprinkler with water. Sprinkle each of the three pans at the same rate, at the same height (about a foot will be satisfactory) and with the same amount of water. What happens to each pan of soil?
   a. Plowed field - water will take bare soil along, and pail will have muddy water.
   b. Field with residue - water running into the pail will be dirty.
   c. The water that flows from the sod will be reasonably clear.

Relate this information to soil in your area. Where have you seen gullies? What caused these gullies? How could erosion have been prevented?

What examples of crop residue have you seen? (Leaves on grass in the fall, grass clippings in gardens, cornstalks and husks and grain chaff left on the fields.)

How does residue help to prevent water erosion? Hillsides are often planted with grass. Give some examples. (Roadsides along freeways, pastures.)

4. From Conserving Soil booklet, use duplicating master ten and eleven entitled "Soil Erosion; How It Occurs, Part I, Part II," on sheet, gully and rill erosions. Conserving Soil is available from your county U.S.D.A. Soil Conservation Service. See RESOURCE GUIDE, PAGE 49, of this notebook for your county number.

Evaluation

Given information, students will identify local examples of sheet, rill, and gull erosion.

Recommended Reference Material

"Minnesota's Ag-Stravaganza" videocassette, available from your Regional Soil and Water Conservation Office. See RESOURCE GUIDE, page 48, for the telephone number.

U.S.D.A. Soil Conservation Service's Conserving Soil duplicating master booklet. To order, see RESOURCE GUIDE, page 49.

Extended Activity

Demonstrate three kinds of water erosion in an outside area. You'll need several plastic pails of water. Locate an outside area where there is exposed soil.

BEST COPY AVAILABLE

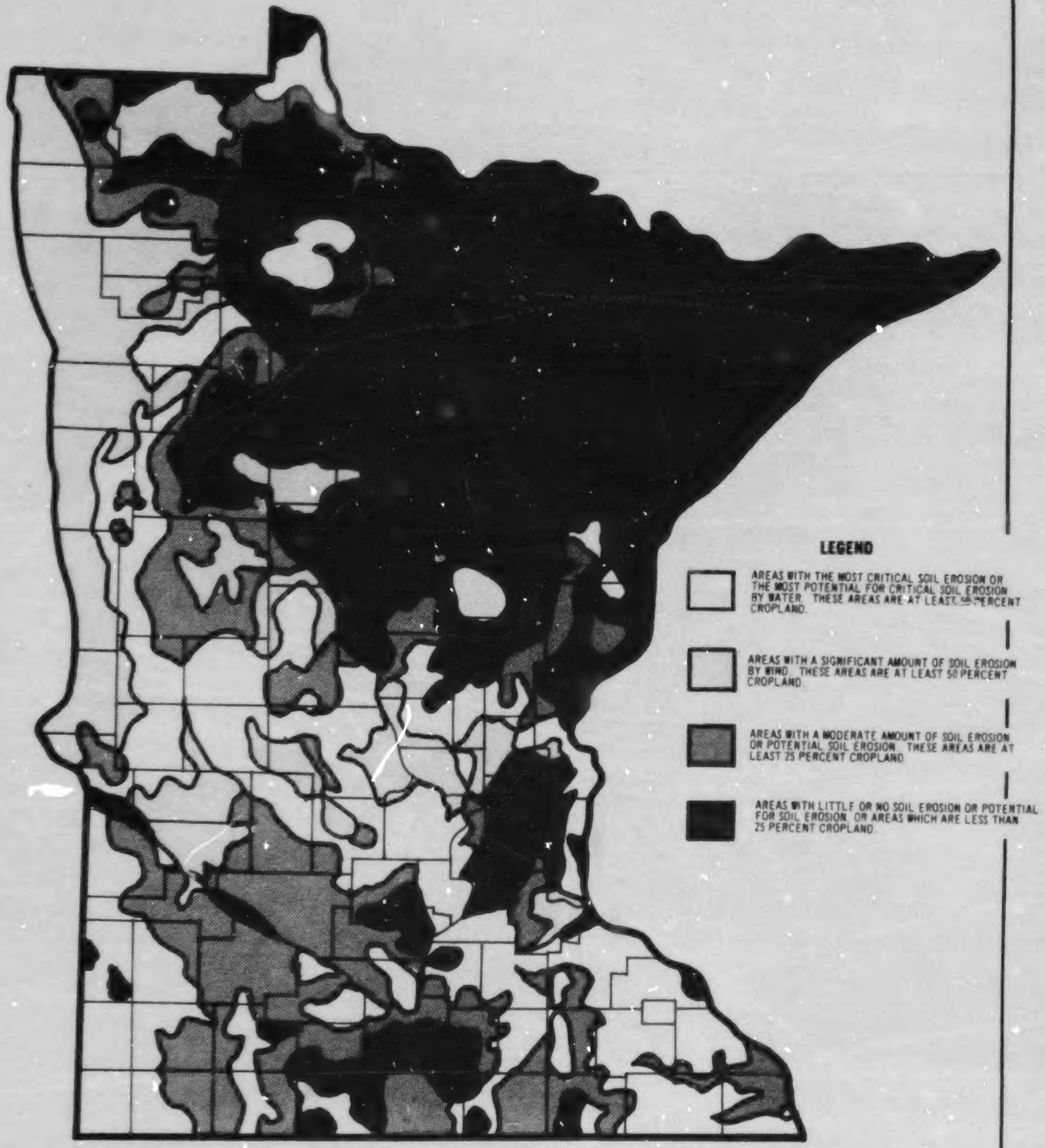
Splash Erosion: (Works well when soil is either very dry, or quite muddy.) Wet hands in the bucket of water. Shake hands over soil so water goes on the ground. Do this until quite a bit of soil is wet. Observe results.

Sheet erosion: Pour a bucket of water out in a sheet with some force. Observe results.

Rill erosion: Pour a bucket of water in one spot. Watch it spread out and form channels.

Discuss the demonstrations: "What does the water do to the soil? What would happen if we poured many buckets of water in the same spot? Where could this happen outside the schoolyard?"

SOIL EROSION IN MINNESOTA



LEGEND

☐ AREAS WITH THE MOST CRITICAL SOIL EROSION OR THE MOST POTENTIAL FOR CRITICAL SOIL EROSION BY WATER. THESE AREAS ARE AT LEAST 50 PERCENT CROPLAND.

☐ AREAS WITH A SIGNIFICANT AMOUNT OF SOIL EROSION BY WIND. THESE AREAS ARE AT LEAST 50 PERCENT CROPLAND.

▨ AREAS WITH A MODERATE AMOUNT OF SOIL EROSION OR POTENTIAL SOIL EROSION. THESE AREAS ARE AT LEAST 25 PERCENT CROPLAND.

■ AREAS WITH LITTLE OR NO SOIL EROSION OR POTENTIAL FOR SOIL EROSION, OR AREAS WHICH ARE LESS THAN 25 PERCENT CROPLAND.

BEST COPY AVAILABLE

SOIL IS LOST BY WIND EROSION

AGE: Grades K-6
SUBJECT: Science
SKILLS: Application, discussion, generalization, observation, visualization
DURATION: 10 minutes
GROUP SIZE: Any
SETTING: Indoors
KEY VOCABULARY: Clay soil, conservation tillage, crop erosion, crop residue, gully, loam soil, mulch, "raised beds", saltation erosion, sandy soil. suspension erosion, topsoil, wind erosion. See Illustrated Vocabulary.

Description

Through wind simulation, students will observe how wind moves soil and how crops and crop residue prevent erosion.

Learner Objective

Students will be able to observe wind erosion and how crop residue prevents erosion.

Background

See Curriculum Framework II, pages 2 and 3.

Topsoil will blow readily, particularly if it is dry and windy. Any covering - crops, grass, trees, mulch or crop residue like corn stalks, straw - will act as a coat to protect the soil from wind erosion. Good vegetative cover on the land is the most permanent and effective way to control wind erosion.

Wind erosion decreases as soil moisture increases.

Materials

- 3 small pans (aluminum cake pans), a pan of sod or grass, a pan with residue (in and on top of soil), and a pan of soil (no residue, no grass)
- a large white garbage bag cut open lengthwise
- hand-held hair dryer

Activity

1. Point out the three kinds of fields to the students. Do as much or as little instruction as is needed to explain the pan with crop residue. The conservation tillage equipment and booklets from local farm implement dealers would be effective teaching tools here.
2. Place aluminum pan with sod cover on white garbage bag. If the garbage bag is crumpled in places, the soil collects in crevices very quickly. With a hair blower, simulate wind.

   Try it with the pan with residue. (You may want to anchor the residue with a knife.) Note how the crop residue acts as a coat and keeps the soil in place.

   Now use the hair dryer on the open field. Collect the soil from the garbage bag.

3. An additional activity - try the wind erosion with sandy soil, loam soil and clay soil. Note differences. Moisture content, as well as texture will have an affect on differences.
4. Relate this information to soil in your area. Which areas are victims of wind erosion? Describe what they look like. What could be done so that the wind would not erode these areas?

   What examples of crop residue have you seen? (Leaves on grass in the fall, grass clippings on the garden, corn stalks and husks and grain chaff left on the fields.)

   How does residue help to prevent wind erosion?
5. How do windbreaks help to prevent wind erosion?

Evaluation

Given a demonstration, students will identify local areas of wind erosion and local methods used to prevent erosion.

Recommended Reference Material

"Minnesota's Ag-Stravaganza" videocassette, available from your Regional Soil and Water Conservation Office. See RESOURCE GUIDE, page 48, for the telephone number.

Extended Activities

1. Tour the school grounds and find areas where there are soil erosion probkems. Watch for problem areas such as gullies, drain spout areas, and places where there is no vegetation.
2. Do a research project on the Dust Bowl of the 1930's.
3. Some gardeners use "raised beds." Draw some diagrams of "raised beds." Tell how they help to prevent soil erosion.
4. Contact your county U.S.D.A. Soil Conservation Office and request 8"x11" maps of Minnesota that indicate areas affected by these three types of wind erosion: saltation, suspension, and creep erosion.
5. Have the children draw pictures of the different ways farmers and city dwellers can both prevent or reduce the damages of wind erosion.

SECTION 2
LEARNING PACKET

RELATIONSHIP OF SOIL TO WIND AND WATER

COMPONENT 4	Compare How Much Moisture Different Soils Hold (K-6)
COMPONENT 5	Running Water and Walking Water (K-2)
COMPONENT 6	How Do People Change Soil? (K-2)
COMPONENT 7	Water: Where It Comes From, Where It's Going (5-6)
COMPONENT 8	Soil is Lost by Water Erosion (4-6)
COMPONENT 9	Soil is Lost by Wind Erosion (K-6)

BEST COPY AVAILABLE

COMPARE HOW MUCH MOISTURE DIFFERENT SOILS HOLD

LEARNER OBJECTIVE:

Students will be able to analyze how water enters different soils, how readily it passes through, and how much is held.

Record how the water enters different soils.

	CLAY SOIL	SANDY SOIL	LOAM SOIL
Minutes before water begins to drip			
Minutes before water stops dripping			
Quantity of water that came through			

COMPONENT 5
ACTIVITY SHEET

RUNNING WATER AND WALKING WATER

LEARNER OBJECTIVE:

Students will be able to demonstrate knowledge of how moving water moves soil.

Draw a picture showing what you learned about "running" water.

Draw a picture showing what you learned about "walking" water.

COMPONENT 6
ACTIVITY SHEET

HOW DO PEOPLE CHANGE SOIL?

LEARNER OBJECTIVE:
Students will be able to analyze how the habits and practices of people affect the soil and growth of plants.

Draw places that plants can grow.

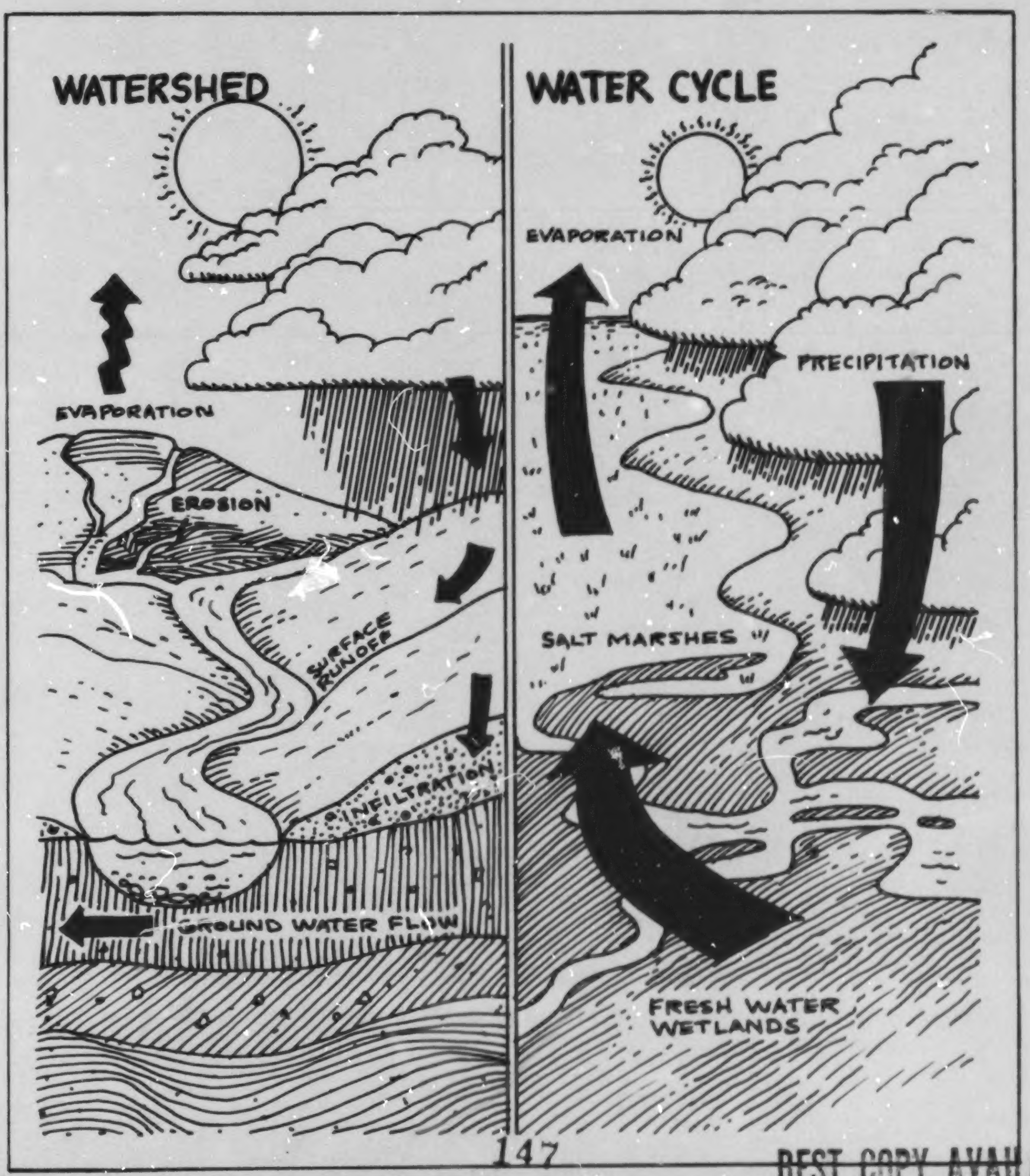
Draw places that plants can't grow.

COMPONENT 7
ACTIVITY SHEET A

WATER: WHERE IT COMES FROM, WHERE IT'S GOING

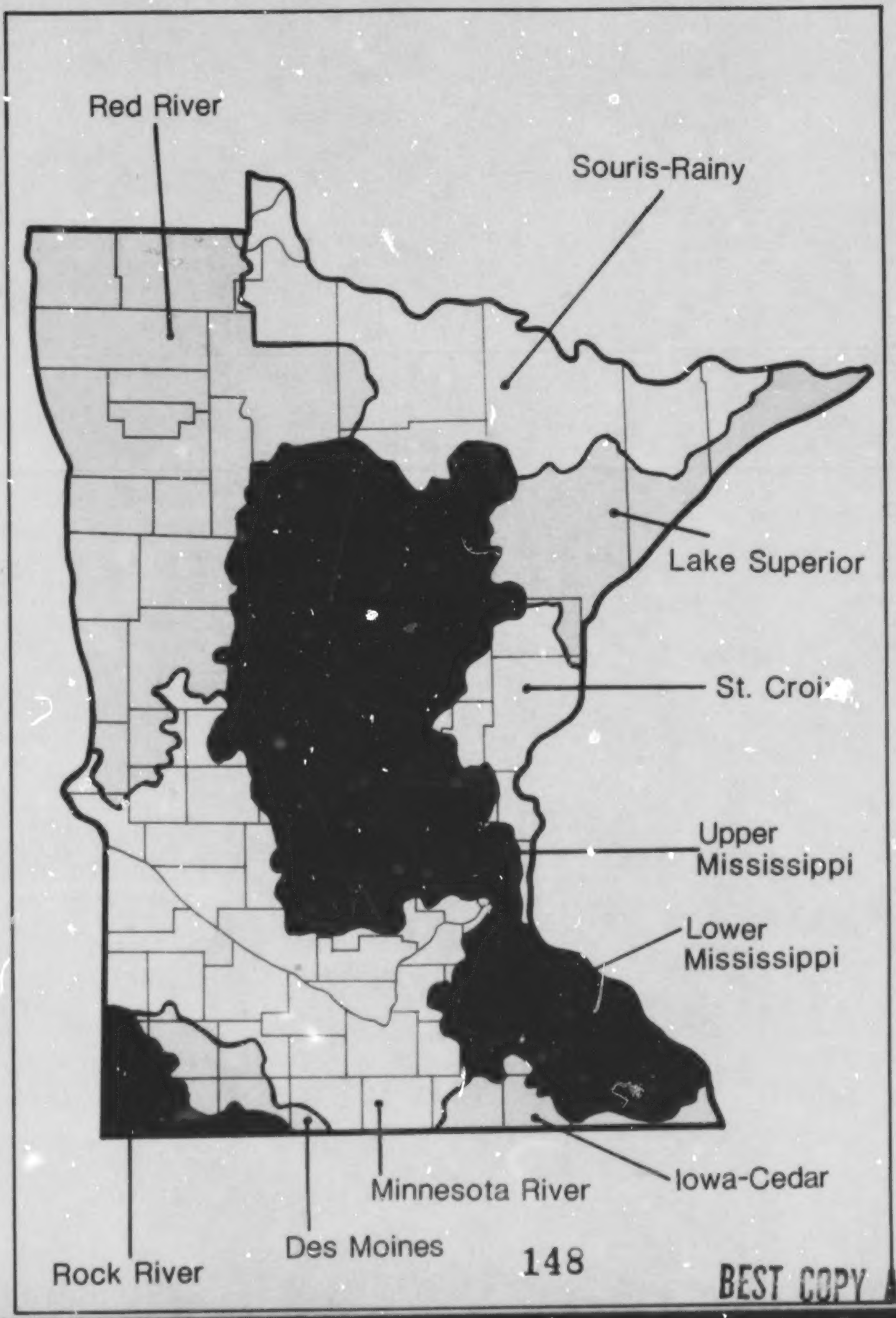
LEARNER OBJECTIVE:

Students will be able to identify local watersheds and drainage areas by using maps and gathering information from local resource people.


WATERSHED
EVAPORATION
EROSION
SURFACE RUNOFF
INFILTRATION
GROUND WATER FLOW
WATER CYCLE
EVAPORATION
PRECIPITATION
SALT MARSHES
FRESH WATER WETLANDS

BEST COPY AVAILABLE

STATE OF MINNESOTA WATERSHED BOUNDARIES


Red River
Souris-Rainy
Lake Superior
St. Croix
Upper Mississippi
Lower Mississippi
Iowa-Cedar
Minnesota River
Des Moines
Rock River

BEST COPY AVAILABLE

Activity Master 10

Soil Erosion:
How It Occurs, Part 1

Objectives

1. Students will identify local examples of sheet, rill, and gully erosion.
2. Students will discuss how sheet, rill, and gully erosion occur.
3. Students will list why sheet, rill, and gully erosion occur.

Supplies Needed: stream table (commercial or homemade)

Ask students to brainstorm reasons why erosion is a serious economic factor. List the reasons on the board. Students should realize that soil erosion is serious and has an impact on all of us. Obvious impacts would be the cost of dredging silt from rivers and harbors. This would increase taxes. In addition, food costs could rise since eroded soils are less productive.

Emphasize the fact that 6.4 billion tons of soils are eroded from U.S. land each year. This amount of soil would fill 320 million average-size dump trucks if each truck carried 20 tons of soil. If these trucks were parked end-to-end and were 25 feet long, they would extend to the moon and three-quarters of the way back.

Describe the three types of erosion caused by moving water and have your students fill in the chart. Then ask your students to search for examples of erosion in their community and answer the remaining questions. If this is not possible, you could take photographs using slide film and project the slides in class. You could also search for examples on the school grounds.

You can demonstrate the types of erosion in the classroom in a commercially purchased stream table. (If you do not have access to a stream table, you can make one out of a shallow, rigid box lined with waterproof plastic. Fill the box with sand.)

Sprinkle water down the sloped stream table. Controlling the amount of water and the slope by trial and error, all three types of erosion can be demonstrated. Demonstrate the effect of slope and vegetation on erosion.

BEST COPY AVAILABLE

CONSERVING SOIL
Activity Master 10

Soil Erosion:
How It Occurs, Part 1

Erosion occurs when the soil is moved from one place to another by moving water or wind. Three types of erosion are caused by moving water: sheet, rill, and gully erosion. Your teacher will describe the differences between the types. Use that information to fill in this chart.

Type of Erosion	Description	Causes
Sheet		
Rill		
Gully		

Look through your community for examples of these types of soil erosion. When you find them, photograph or draw pictures of them. Then answer these questions.

Sheet Erosion

Where did you see sheet erosion? ______________________________

____

How did you know sheet erosion had occurred? ______________________________

____

Why did sheet erosion occur in this area? ______________________________

____

Rill Erosion

Where did you see rill erosion? ______________________________

____

How did you know that rill erosion had occurred? ______________________________

____

Why did rill erosion occur in this area? ______________________________

____

Gully Erosion

Where did you see gully erosion? ______________________________

____

How did you know that gully erosion had occurred? ______________________________

____

Why did gully erosion occur in this area? ______________________________

____

Activity Master 11

Soil Erosion: How It Occurs, Part 2

Objectives

1. Students identify local examples of land slippage and wind erosion.
2. Students will list why land slippage and wind erosion occur.
3. Students will rank the erosion problems in their community.

Supplies Needed: none

Students should be able to answer the true-or-false questions on wind erosion and land slippage from information gained from previous activities. Otherwise you could ask for volunteers for answers and cover one question at a time. Explain to your students why each question is true or false.

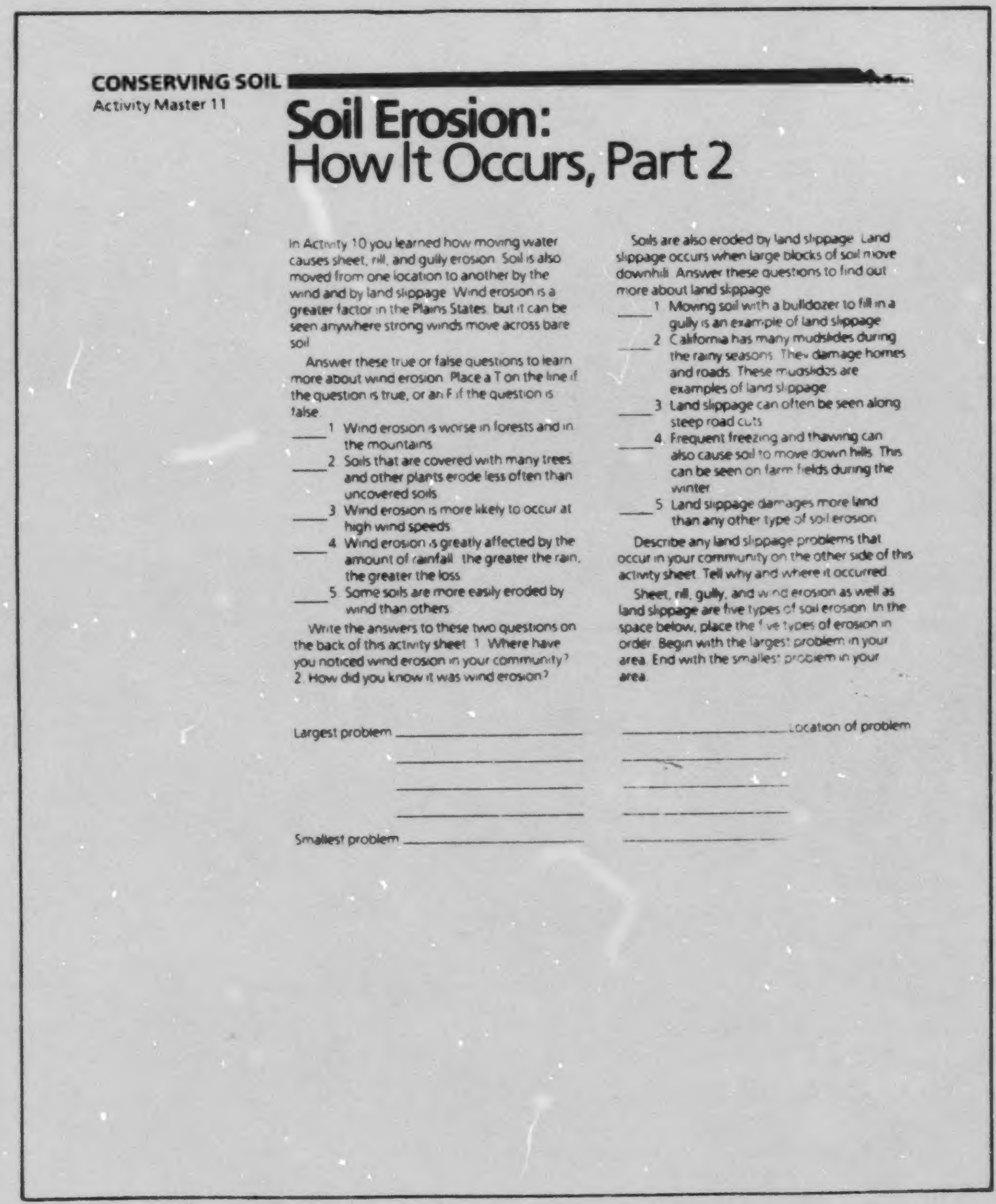
Next your students can search for examples of wind erosion and land slippage. Wind erosion can be difficult to see. Evidence includes very small dunes of silt and sand around rocks, trees, and other obstructions to the wind. They somewhat resemble snow drifts but are much smaller. Another clue is gritty dust on window sills in your house. Land slippage is more common along riverbanks and steep road embankments.

As the final activity, review the five types of erosion. Then have your students rank them from the largest to the smallest for your area. The problems may vary within your community. To obtain rankings, they can interview local farmers or the city manager. Or they can use personal observations. To determine the actual ranking of soil erosion in your location, contact your local Soil Conservation Service or conservation district office.

Answer Key

1.	F	1.	F
2.	T	2.	T
3.	T	3.	T
4.	F	4.	T
5.	T	5.	F

BEST COPY AVAILABLE



CONSERVING SOIL
Activity Master 11

Soil Erosion: How It Occurs, Part 2

In Activity 10 you learned how moving water causes sheet, rill, and gully erosion. Soil is also moved from one location to another by the wind and by land slippage. Wind erosion is a greater factor in the Plains States, but it can be seen anywhere strong winds move across bare soil.

Answer these true or false questions to learn more about wind erosion. Place a T on the line if the question is true, or an F if the question is false.

_____ 1. Wind erosion is worse in forests and in the mountains.
_____ 2. Soils that are covered with many trees and other plants erode less often than uncovered soils.
_____ 3. Wind erosion is more likely to occur at high wind speeds.
_____ 4. Wind erosion is greatly affected by the amount of rainfall: the greater the rain, the greater the loss.
_____ 5. Some soils are more easily eroded by wind than others.

Write the answers to these two questions on the back of this activity sheet. 1. Where have you noticed wind erosion in your community? 2. How did you know it was wind erosion?

Soils are also eroded by land slippage. Land slippage occurs when large blocks of soil move downhill. Answer these questions to find out more about land slippage.

_____ 1. Moving soil with a bulldozer to fill in a gully is an example of land slippage.
_____ 2. California has many mudslides during the rainy seasons. They damage homes and roads. These mudslides are examples of land slippage.
_____ 3. Land slippage can often be seen along steep road cuts.
_____ 4. Frequent freezing and thawing can also cause soil to move down hills. This can be seen on farm fields during the winter.
_____ 5. Land slippage damages more land than any other type of soil erosion.

Describe any land slippage problems that occur in your community on the other side of this activity sheet. Tell why and where it occurred.

Sheet, rill, gully, and wind erosion as well as land slippage are five types of soil erosion. In the space below, place the five types of erosion in order. Begin with the largest problem in your area. End with the smallest problem in your area.

Largest problem ____________________ ____________________ Location of problem
____________________ ____________________
____________________ ____________________
____________________ ____________________
Smallest problem ____________________ ____________________

SECTION 3

RELATIONSHIP OF SOIL TO PLANTS

ACTIVITIES

- Compare Soils By Growing Plants
- Healthy Roots Are Important
- Happy Soil, Sad Soil

FOOD COMES FROM SOIL

Minnesota is Losing Lots of Soil
More Than 100 Acres A Day
To Development
(That is more than 100 football fields)
Tons Annually to Erosion

Governor's Council on Rural Development

GCRD

BEST COPY AVAILABLE

SECTION 3

TEACHING PACKET

RELATIONSHIP OF SOIL TO PLANTS

COMPONENT 10	Compare Soils by Growing Plants (K-6)
COMPONENT 11	Healthy Roots are Important (2-6)
COMPONENT 12	Happy Soil, Sad Soil (3-6)

BEST COPY AVAILABLE

COMPARE SOILS BY GROWING PLANTS

AGE: Grades K-6
SUBJECT: Science
SKILLS: Analysis, application, classification, comparison and contrast, description, discussion, drawing, evaluation, generalization, inference, observation.
DURATION: One class period with follow-up time
GROUP SIZE: Any size
SETTING: Indoor or outdoor
KEY VOCABULARY: Alkali, biodegradability compost, decomposition, eroded soil, fencerow, nutrients, organic matter, percolation, subsoil, topsoil. See Illustrated Vocabulary.
LEARNING PACKET: Activity Sheet
SOURCE: R.U.R.A.L. - Religious understanding of Resources in American Lifestyles - Sr. Annette Fernholz, SSND

Description

Students will compare topsoil, eroded soil and subsoil by growing plants in them.

Learner Objective

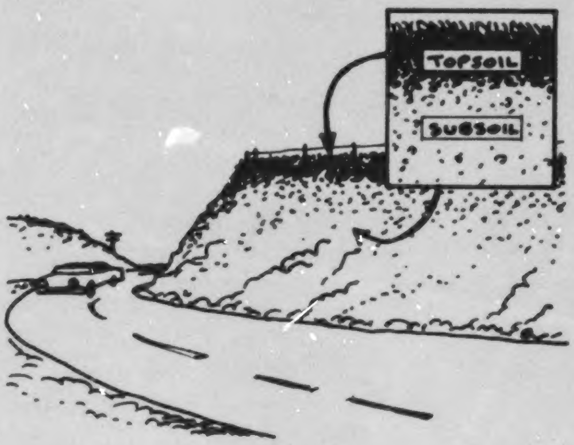
Students will be able to identify the difference in the rate of plant growth in three soils that vary in organic matter content.

Background

See Curriculum Framework III, pages 3 and 4.

In general, soils that are above average in organic matter are more productive than soils low in organic matter. Organic matter improves soil in many ways. It increases its water-holding capacity; it serves as a storehouse for plant nutrients such as nitrogen; and it provides food for the countless bacteria and other living things in the soil. Some of these organisms produce acids that in turn help break down soil minerals.

This explains why plants usually grow better in topsoil than in subsoil.



It is possible, however, to find a subsoil that is more productive than the topsoil. This might be true where water percolating down through the soil has leached plant nutrients from the topsoil and deposited them in the subsoil below. It may alse be true in desert soils where organic matter seldom accumulates in the surface layer or where alkali forms at the surface and makes the soil toxic for plants.

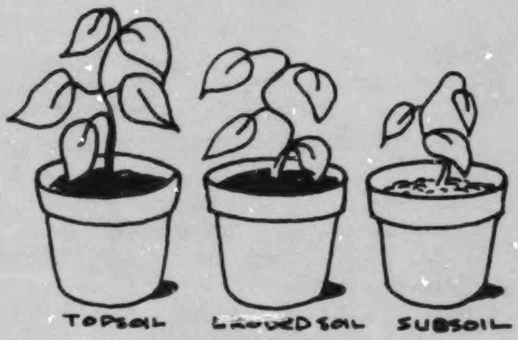
Materials

- 3 or 4 flowerpots
- Different types of soil
- Record chart
- 3 or 5 beans for each pot
- Available spot for sunshine
- Water
- Component 10 Activity Sheet from Learning Packet.

Activity

1. Remind students that plants take all their mineral nutrients from the soil. The minerals that are found in the soil (except those added in the form of fertilizer) depend mainly on what was in the rock the soil came from.
2. Fill the flowerpots with soil from the following locations:
   a. Topsoil from an old fence row or from a pasture that has never been plowed.
   b. Soil that has eroded from a hillside.
   c. Subsoil from a depth of 3 to 4 feet.

   If you happen to live in a city, take samples from a flowerbed, an excavation for a building, and from an eroded roadbank.
3. Plant several beans in each pot. (Soaking the beans overnight will hasten the germination.)
4. Keep the pots well watered and place them where they will receive warmth and sunlight.
5. Compare the rate of growth. Use Component 10 Activity Sheet from the Learning Packet to record the plant growth.



Evaluation

Given three types of soil, students will note the growth of seeds and record it by drawing what they see.

Recommended Reference Materials

U.S.D.A. Conservation Service's Conserving Soil Booklet, Transparency 2. "A Soil Profile." See RESOURCE GUIDE, page 49 for your county.

Extended Activities

1. You will need two clear plastic cups. In one cup place several inches of topsoil and plant a seed in it. In the other cup, put only a little soil and plant a seed. Observe the growth in both. Note differences in the amount of soil and the amount of room for roots to grow.
2. Place a few earthworms into a tall pickle jar of dirt. Watch it as it goes back and forth - bringing air into the soil, fertilizing the soil. Ask students to write a poem or a short story about the activities of the earthworm. "If I were an earthworm, I would ..." Tell about your adventures in the soil.

BEST COPY AVAILABLE

3. For this composting lesson have students bring:
   - Cut grass
   - Vegetable or fruit peelings
   - Half pint milk container of soil
   - Plastic pail

Select three students to be in charge of this compost project a day ahead of time. Ask each student to bring a small baggie of vegetable or fruit peelings or cut grass. The three students in charge will tape the name of each student on the baggie as it is brought to school in the morning and keep it in the science area.

During science class, the three students in charge will empty each student's baggie into a plastic pail as they identify the contents. After every ten baggies, sprinkle a little soil. When all materials are in the compost pail, aks "What do you think will happen to all our peelings and grass?" (decompose) "What will it turn into?" (good soil for growing.) "Is there any machine that will make soil?" (No, it is formed very slowly by nature.)

For an additional activity, use U.S.D.A. Soil Conservation Service's Conserving Soil booklet, Activity Master 24, "Recycling Organic Waste." See RESOURCE GUIDE, page 49 for your county.

HEALTHY ROOTS ARE IMPORTANT

AGE: Grades 2-6
SUBJECT: Science
SKILLS: Analysis, application, comparison and contrast, description, generalization, observation, research
DURATION: 20 minutes
GROUP SIZE: Any
SETTING: Indoor or outdoor
KEY VOCABULARY: Alfalfa, erosion, legumes, organic matter, nodules. See Illustrated Vocabulary.
LEARNING PACKET: Activity Sheet

Description

Students will decide which kind of roots will best help to prevent erosion.

Learner Objective

Students will be able to recognize how roots can help prevent erosion.

Background

See Curriculum Framework III, page 3.

Roots hold soil in place. Healthy, sturdy roots help to prevent erosion.

The roots of legume plants, such as soybeans, alfalfa, clover, and peas, take nitrogen from the air and release it into the soil.

Organic matter from decaying plants is an essential part of good soil. It also provides nitrogen to plants.

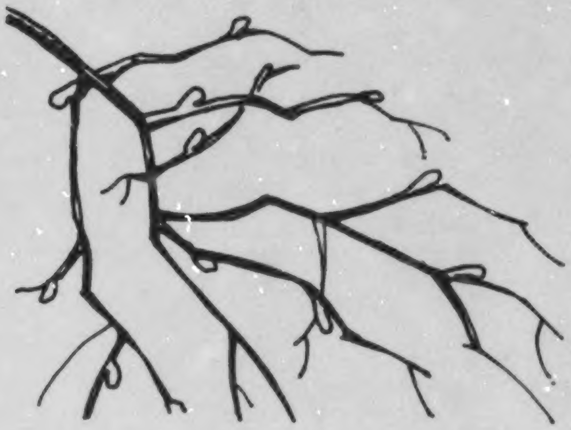
Materials

- Spade
- Several plastic bags
- Transparency master on roots
- Place where grass, weeds or vegetables are growing
- Component 11 Activity Sheet from the Learning Packet

Activity

1. Either take the children outside to turn over a spadeful to root-filled soil or bring this into the classroom. (A retured farmer, a gardener, or a resource person from the U.S.D.A. Soil Conservation Service could help you. See RESOURCE GUIDE, page 49.)
2. Using a plastic bag as a catch-all, examine the root structures to see how they hold the soil. Shake the clump. Does the soil shake easily from the roots? (This will vary with the kind of soil.) Students will discover that the black soil filled with organic matter clings to the roots.
3. If possible, examine legume roots like alfalfa, clover, soybeans, beans, or peas. (You may want to grow some of these in your classroom.) Note the nodules on the roots.

   Explain to the children that these plants produce nodules on their roots that contain nitrogen-fixing bacteria. These bacteria take nitrogen from the air and combine it with other elements to make food that they and other plants can use. These legumes help to increase the organic matter in the soil. Soils rich in organic matter do not erode readily. Roots hold the soil so it does not wash or blow away.



4. Using Component 11 Activity Sheet, have the children write a poem or a story from the point of view of a root, "I am a Root of a ---." Include at least three things you do as a root. (Example: I like to hide in the soil. I grow in all directions. I like water. I like to wrap myself around the soil.)

Evaluation

Given information, students will create a story from the point of view of a root.

Extended Activities

1. You can watch plants grow from cuttings. Note how cuttings develop roots.

   Plant small cuttings of geranium, African violet, coleus, juniper, grape, honeysuckle, or tomato in shallow box of sterile sand (vermiculite or kitty litter). Keep moist, give indirect light, see which plants make roots first. Transplant to pots or garden for further growth.
2. Ask each child to bring in two root vegetables (potatoes, onions, garlic, radishes, beets, rutabegas, turnips, etc.). Cut them into small chunks. Put in a large kettle with bouillon cubes and water and make soup. Let it simmer and end the day with a soup treat.
3. Make vegetable prints. Dip in tempera and print on plain paper. Post a few of the most colorful examples on the bulletin board.
4. What plants like to grow in water? Talk about wild rice in Minnesota, plants in lakes and streams.

BEST COPY AVAILABLE

HAPPY SOIL, SAD SOIL

AGE: Grades 2-6
SUBJECT: Language Arts
SKILLS: Description, classification, comparison and contrast, discussion, drawing, evaluation, expressive writing, generalization, inference, listing
DURATION: 25 minutes
GROUP SIZE: Preferably groups of 10 students
SETTING: Indoors
KEY VOCABULARY: Compacted soil, conservation tillage, contouring, crop residue, legumes, manure nutrients, organic matter, soil, aeration, terracing. See Illustrated Vocabulary.

Description

Students will brainstorm about what makes soil happy and what makes soil sad.

Learner Objective

Students will be able to identify the characteristics of happy soil and sad soil.

Background

See Curriculum Framework III, page 3 and Curriculum Framework VI, pages 6 and 7.

Soil is happy when it has several basic requirements.

A. Soil needs sufficient air spaces for roots to grow and for moisture to be absorbed. Earthworms and some machines help to loosen the soil. Heavy machinery and hard rains compact the soil, thereby decreasing air spaces.

B. Soil needs nutrients to supply plant roots with food for plants. Decaying organic matter (leaves, grass, manure crop residue like corn stalks and husks and grain chaff) returns nutrients to the soil.

C. Soil needs water. Some farming practices, such as conservation, terracing and contour tillage, help to stop the rain and retain it so it has time to soak into the soil. Water movement in the soil brings better air circulation. When water enters the soil, air moves out and is replaced by fresher air as soon as the soil pores are again free of water (soil aeration).

Materials

- 24 small labels
- 24 popsicle sticks
- Pan of soil - separated into two halves by a piece of cardboard

- Component 12 Activity Sheets A and B from the Learning Packet
- *Conserving Soil* Transparency 1 (Colored transparency available through U.S.D.A. Soil Conservation Service's *Conserving Soil* booklet. See RESOURCE GUIDE, page 49.)

Suggested Warm-Up Activities

1. Take the class outside to an area of thick grass and near trees, if available. Compare the clothes that people wear to the thin cover at or near the soil surface. Discuss the reasons why we wear clothes and why the soil might need "clothes." Discuss what it feels like to be outside without a jacket when it is windy and rainy. Look at the variety of garments students are wearing and ask students to describe the kinds of "clothes" that might cover soil within the local community. Imagine how soil "feels" when it doesn't have a jacket of grass or crops or trees. How would it be affected by the sun? (baked) by wind? (Wind will blow soil away if it is not protected.) By water? (Topsoil washed away. This topsoil contains the plant food that plants need to grow.)
2. What does the good land look like? Read the following selection from Ann Dillard's, *Pilgrim at Tinker Creek*, page 96, about all that's in a teaspoon of soil.

   "...Take just the top inch of soil, the world squirming right under my palms. In the top inch of forest soil, biologists found "an average of 1,356 living creatures present in each square foot, including 865 mites, 265 springtails, 22 millipedes, 19 adult beatles and various numbers of 12 other forms...Had an estimate also been made of microscopic population, it might have ranged up to two billion bacteria and many millions of fungi, protozoa and algae - in a mere teaspoonful of soil."[1]

Activity

1. Use transparency 1 from U.S.D.A. Soil Conservation Service's *Conserving Soil* booklet as a visual aid to brainstorm some ideas about sad and happy soil.

Happy Soil	Sad Soil
Earthworms	Full of weeds
Gentle rain	Junk
Legumes	Baked in the sun
Crop rotation	Hard rain
Conservation tillage	Packed hard
Trees	No crops or flowers
Sunshine	Asphalt
Lots of air spaces	No air spaces
Flowers	Strong winds
Crop residue	Three wheelers
Contouring	Gullies
Windbreaks	Tornadoes

2. Write or draw pictures of these ideas on little papers and paste them on popsicle sticks.
3. Place a divider in the pan of soil. One side is Happy Soil and the other is Sad Soil.
4. Then students can review the lesson by taking turns placing these popsicle sticks on the appropriate side of the divider and explain why they chose as they did.

   OR: You may want to have all the labels on the popsicle sticks already and have the children place them on the appropriate side and explain why they chose the Happy Soil side or the Sad Soil side.

Students can also do the Component 12 Activity Sheets A and B in the Learning Packet on Happy Soil and Sad Soil.

Evaluation

Given a chart, students will list characteristics of happy soil and sad soil.

Given three characteristics of soil, students will create two stories from the viewpoints of happy soil and sad soil.

Recommended Reference Material

"Minnesota's Ag-Stravaganza" videocassette available from your Regional Soil and Water Conservation Office. See RESOURCE GUIDE, page 48, for telephone number.

Extended Activities

1. Demonstrate that soil contains air. Place a lump of soil into a glass jar. Add water until it is about 1 inch above the top of the soil.

   Watch carefully. Do you see bubbles coming up through the water? Why does adding water make bubbles? What might these bubbles be?

   The bubbles that you see when you pour water onto soil are air bubbles. Air, whether in the soil or aboveground, is made up of gases. In soil, three of these - oxygen, nitrogen and carbon dioxide - are especially important.

   Plants and animals that live underground need a constant supply of fresh air. What happens to these plants and animals when an airport, houses, factories, driveway, or shopping center are built on it? Can this soil breath, absorb moisture, and help to prevent floods?

2. Some students may appreciate seeing soil as the poet, Joe Paddock, does in "Black Energy."

BLACK ENERGY

Life is seething in this soil which has
been millions of years in the making.
It has been forever in the making.

A mingling of untold billions of bodies
of plants and animals; grasses of this
prairie, buffalo and antelope grazing
down into roots and back again into
the sun. Birds and insects, their
wings still hum in this soil.

And this swarm drinks sunlight and
rain, and rises again and again into
corn and beans and flesh and bone.

The quick bodies of animals and men
risen from this black energy.

SECTION 3

LEARNING PACKET

RELATIONSHIP OF SOIL TO PLANTS

COMPONENT 10	Compare Soils by Growing Plants (K-6)
COMPONENT 11	Healthy Roots are Important (2-6)
COMPONENT 12	Happy Soil, Sad Soil (3-6)

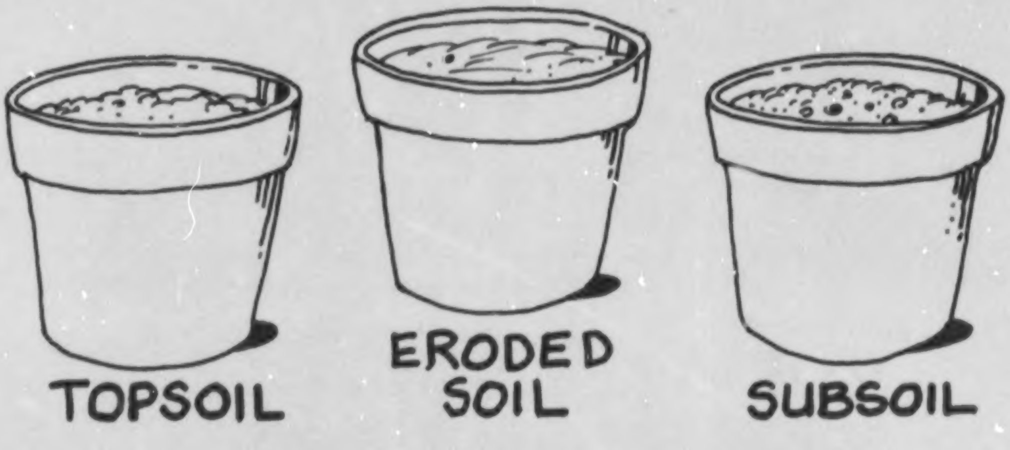
COMPONENT 10
ACTIVITY SHEET

COMPARE SOILS BY GROWING PLANTS

LEARNER OBJECTIVE:

Students will be able to identify the difference in the rate of plant growth in three soils that vary in organic matter content.

Draw the growth you see in each flowerpot.


TOPSOIL
ERODED SOIL
SUBSOIL

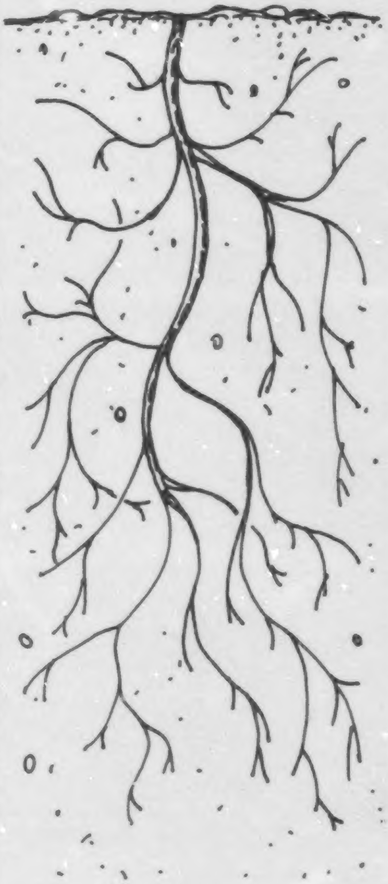
COMPONENT 11
ACTIVITY SHEET

HEALTHY ROOTS ARE IMPORTANT

LEARNER OBJECTIVE:

Students will be able to recognize how roots can help prevent erosion.

I am a root of a ____________



Draw a picture of your plant in the space above.

BEST COPY AVAILABLE

COMPONENT 12
ACTIVITY SHEET A

HAPPY SOIL, SAD SOIL

LEARNER OBJECTIVE:

Students will be able to identify the characteristics of happy soil and sad soil.

HAPPY SOIL ☺	SAD SOIL ☹

Think about things that would make soil happy or sad. Then put the following thing under the right heading above. Add some of your own if you wish.

---

full of weeds
junk
baked in the sun
fertilizer
earthworms
hard rain
conservation tillage
lots of air spaces
gentle rain
legumes
crop rotation
packed hard
warm sun
trees
flowers
no flowers or crops
asphalt
no air spaces
three wheelers
strong winds
crop residue
windbreaks
contouring
tornadoes

COMPONENT 12
ACTIVITY SHEET B

HAPPY SOIL, SAD SOIL

LEARNER OBJECTIVE:
Students will be able to identify the characteristics of happy soil and sad soil.

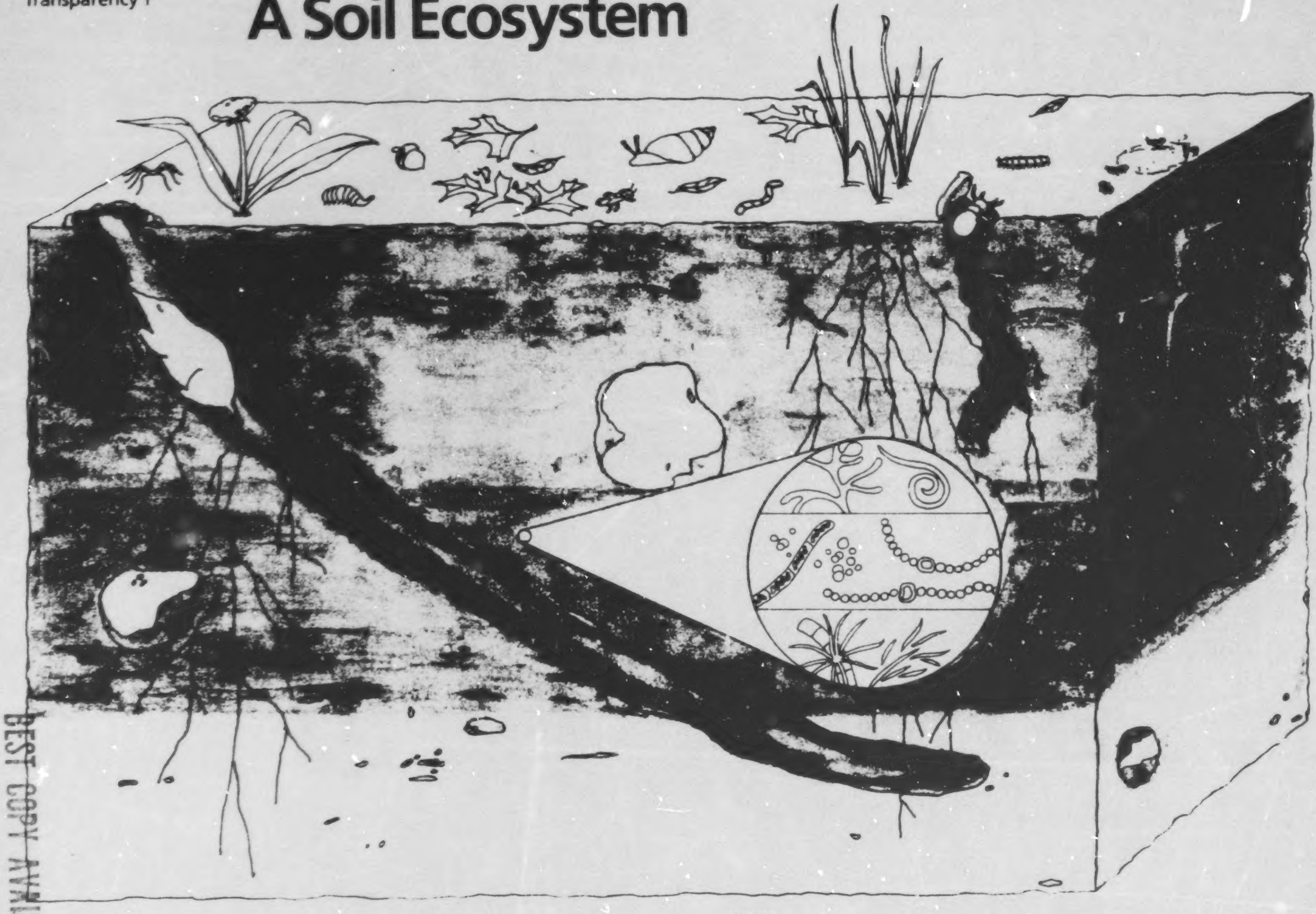
I am sad soil.

I am sad because ______________________

I am happy soil.

I am happy because ______________________

A Soil Ecosystem



BEST COPY AVAILABLE

SECTION 4

SOIL PRODUCTIVITY IN MINNESOTA

ACTIVITIES

- Minnesota Food Maps
- Graph of Disappearing Farmland and Increasing Population in Minnesota

Minnesota
Produces Lots of Food.
Soil is the Resource That Produces
The Food.

WE ARE LOSING SO MUCH SOIL

More Than 100 Acres are Being Covered Every Day
(That is more than 100 football fields.)
Tons Are Lost Every Year To Wind and Water Erosion
Governor's Council on Rural Development

GCRD

SECTION 4
TEACHING PACKET

SOIL PRODUCTIVITY IN MINNESOTA

COMPONENT 13 Minnesota's Soil Produces Much Food (5-6)
COMPONENT 14 Dirt, Who Needs It? (5-6)
COMPONENT 15 Disappearing Farm Land in Minnesota (5-6)

MINNESOTA'S SOIL PRODUCES MUCH FOOD

AGE: **Grades 5-6**
SUBJECT: **Social Studies**
SKILLS: **Analysis, application, discussion, generalization, inference, media construction, problem solving, synthesis, visualization**
DURATION: **35 minutes**
GROUP SIZE: **Several groups of 4**
SETTING: **Indoor**
KEY VOCABULARY: **Clay soil, cropland, fertile soil, loam soil, sandy soil, urban sprawl, water erosion. See Illustrated Vocabulary.**
LEARNING PACKET: **Activity Sheet and Minnesota map**

Description

Students will use Minnesota maps to become aware of foods grown in Minnesota.

Learner Objective

Students will be able to identify where food crops are grown in Minnesota.

Background

See Curriculum Framework IV, pages 3 and 4.

Minnesota is in the heartland of food production. The activity sheet for Component 13 will help students become aware of the vast variety of foods grown on Minnesota's fertile soil. Every farmer in Minnesota feeds 78 other people.[1]

World population figures continue to grow and so does the need for food. The population increase indicates that non-farm claims on cropland for residences, factories, stores, etc. will also increase. Daily, in Minnesota, over 100 acres of cropland is bulldozed for highways, housing developments, and other non-agricultural uses.[2] We need to be aware of the value of our farmland so we will adequately protect it from wind and water erosion and unplanned urban sprawl.

Materials

- Video-cassette, "Minnesota's Ag-Stravaganza," available from your Regional Soil and Water Conservation Office. See RESOURCE GUIDE, page 48.
- Replicate the enclosures for the group from Component 13 Learning Packet.
- Large or small Minnesota county maps. (Large maps for your entire class are available at no cost at your Regional Soil and Water Conservation Offices. See RESOURCE GUIDE, page 48.)
- Component 13 Activity Sheet

---

[1] The Discover Minnesota Agriculture Series, Minnesota Agricultural Statistics Service, January, 1983.

[2] "Minnesota's Farmland: An Endangered Resource", U.S.D.A. Soil Conservation Service, 1981.

Activity

1. Show "Minnesota's Ag-Stravaganza" video-cassette. (12 minutes in length)
2. Divide students into groups of four. Plan a menu for your group for one meal using Component 13A Activity Sheet as reference. Cut out symbols for the foods that are grown in Minnesota. Paste the symbols on the Minnesota map where these foods are produced. Draw a key for your symbols. Draw symbols on the maps. Menus could be displayed on the bulletin board.

Evaluation

Given a map and data, students will construct their own map to indicate where the food that they eat is grown in Minnesota.

Recommended Reference Material

1. The U.S.D.A.'s Great American Farm packet contains colorful informative wall chart and duplicating masters to help students learn more about agricultural production and costs. See RESOURCE GUIDE, page 70.
2. FOOD FOR AMERICA - FFA Tells the Story. The booklet contains activity sheets and dittos that introduces the business of agriculture to elementary students, $3.25. See RESOURCE GUIDE, page 70. Your local Future Farmers of America (FFA) chapter may have copies. Contact your high school agriculture instructor for additional help with this activity. For a listing of instructors, see RESOURCE GUIDE, page 31.
3. An Educational Package on Minnesota Agriculture for grades 4 and 5 has been developed by Minnesota Women for Agriculture. It contains an educational project designed to teach children in grades four and five about the crops and animals of Minnesota. See RESOURCE GUIDE, page 70.
4. "Country Kids", a magazine for students K-6, published bimonthly. This publication educates and entertains readers through farm orientated articles, puzzles, games, crafts, quizzes and contests. See RESOURCE GUIDE, page 67.

Extended Activities

1. Using the Soils Map found on the Component 13 Extended Activity Sheet B and the Component 13 Activity Sheet A, chart the crops grown in loam soil, clay soil, and sandy soil.
2. Students could write essays entitled "Save our Farmland."
3. Have the children go on a field trip to a grocery store. How many foods can they find from Minnesota? Do the same foods also come from other states? Have the children pick another state to research what foods are grown there. Suggest that they can write to each state for basic information. Contact the state's Agricultural Statistic Service.

DIRT, WHO NEEDS IT?

AGE: Grades 5-6
SUBJECT: Science, Social Studies
SKILLS: Application, generalization, inference, listening, visualization
DURATION: 30 minutes
GROUP SIZE: Any
SETTING: Indoor
KEY VOCABULARY: Acid rain, biodegradeable, glacial deposits gully, nutrients, pollute, reservoirs sediment, soil conservation, soil erosion, terraces, topsoil, wasteland. See Illustrated Vocabulary.
LEARNING PACKET: Conserving Soil, Master 13

Description

Students will become aware of ways to protect the soil from wind and water erosion.

Learner Objective

Students will be able to understand the need to protect soil from water and wind erosion.

Background

See Curriculum Framework IV, pages 3 and 4 and Curriculum Framework V, pages 4, 5, and 6. Students all have different perceptions of how valuable soil is. This exercise, which features children their own age, will raise students' awareness level to the ways of protecting agricultural land in Minnesota.

Materials

- Cassette-slide tape presentation, "Dirt, Who Needs It?" produced by Minnesota Association of Soil and Water Conservation Districts (MASWCD). Every MASWCD district has a copy of these slides and tape. See RESOURCE GUIDE, page 53. Request a carousel also if your school doesn't have one. You might want to invite the resource person to your classroom.
- U.S.D.A. Soil Conservation Service's Conserving Soils, Master 13 in Learning Packet

Activity

1. Ask students to list all the words that come to their minds when they hear the SOIL. Make a list of these on the board. Ask them to listen for their words and new ones in the slide-tape presentation. It might be interesting to note which words have positive and which have negative connotations.
2. Show slide-tape presentation, "Dirt, Who Needs It?" (12 minutes).
3. Ask students to add any new words. How did the slide-tape presentation clarify other words?

4. Use duplicating master number 13, "Why Conserve Soils," from Conserving Soil booklet as a follow-up activity. This can be group work or an individual assignment.

Evaluation

Given information, students will categorize reasons for conserving soil.

Recommended Reference Material

U.S.D.A. Soil Conservation Service's Conserving Soil duplicating master booklet. To order, see RESOURCE GUIDE, page 49.

Extended Activities

1. As they ride through the country on a trip with their parents, have the students sketch and comment on, in a scrapbook, soil conservation practices they see. Have them look for good soil conservation practices and poor ones. Also, have them write down their questions. They should look for:
   a. Windbreaks - Where are they? Why?
   b. Is the land flat? Rolling? Hilly? What kind of crops are growing on the flat land? Rolling areas? Hilly fields? Why do you think each kind of field is used for different crops?
   c. What signs of good soil conservation practices did you see? Contouring? Terracing? Strip cropping? Others? Make some sketches in your scrapbook of good conservation practices.
   d. What signs of soil erosion did you see? Gullies? Where? Caused by what? Sketch some of the scenes.
   e. Did you see little streams meandering through pastures and fields? Is there uncultivated along the streams? Why should this land be kept uncultivated? (Waterways needed for wildlife, they will take its natural course.) Make sketches of your observations. Write some comments under your sketches.
   f. Did you see any new buildings being constructed? What signs of soil erosion did you see? What must be done to prevent further erosion? Make some sketches of what you saw. Label your sketches.

   Share your scrapbook with your science class when you study soils or conservation.
2. Work and discuss together Activity Master 16, "Matching Land Use With Soils" from Conserving Soil booklet.

   Then, for one week, devote one classroom bulletin board to Minnesota's greatest resource - the soil. Bring newspaper or maganzine articles or pictures about soil usage, conservation practices, pipelines, powerlines across agricultural areas, nuclear power plants, pollution of water from chemical run-off, acid rain and other related concerns. Have students write one sentence explaining how this affects soil. Each article is worth 25 points. Have each student aim for 100 points.
3. Work and discuss together Activity Master 22, "Soil Pollution from Hazardous Chemicals" from Conserving Soil booklet.

   Which soaps are biodegradable? Which are not? Where can you find out? Make a display or collage of each.

DISAPPEARING FARMLAND IN MINNESOTA

AGE: Grades 5-6
SUBJECT: Social Studies, Math
SKILLS: Comparison and contrast, computation, evaluation, inference, visualization
DURATION: 20 minutes
SETTING: Indoors
KEY VOCABULARY: Cropland, fertilizer, prime farmland, topsoil. See Illustrated Vocabulary.
LEARNING PACKET: Activity sheets

Description

Using the given information, students will complete population and farmland graphs.

Learner Objective

Students will be able to compare the relationship between disappearing farmland and the population's food needs in Minnesota from 1940-2000.

Background

See Curriculum Framework IV, pages 3 and 4.

"Minnesota is losing ground - literally. Over 100 million tons of topsoil erode yearly from the state's cropland. That's enough soil to bury both sides of I-94 twelve feet under from Minneapolis to Miles City, Montana.

Minnesota is losing ground in another way. Annually, 49,000 acres of farmland are lost to urban encroachment. Daily, an average of 134 acres of cropland is bulldozed for highway's housing developments, and other nonagricultural uses. One-third of this converted land is prime farmland, the state's richest and most productive land. What impact does this soil tive land. What impact does this soil loss and conversion of farmland have on you? Plenty. Farmers have to plant on less productive land, which requires more fertilizer and other additional costs. As the farmer's costs go up, so do the consumer's."

From "Minnesota's Farmland: An Endangered Resource," U.S.D.A. Soil Conservation Service, 1981.

Materials

- Component 15 Activity Sheets A and B from Learning Packet, on Minnesota's Population (1940-1980) and Minnesota's Farmland (1940-1980).
- Colored markers

Activity

1. Using Component 15 Activity Sheets A and B, "Minnesota's Population" and "Minnesota's Farmland", graph the information for each decade from 1940 to 1980. Then project population and farmland in 1990 and 2000.

   When projecting population and farmland for 1990 and 2000, students may choose to graph what they think realistically will happen; or to graph what they dream idealistically could happen.

2. Have students explain their projections in a brief paragraph. Share them to compare differing viewpoints.
3. Each day in Minnesota, 135 acres of farmland are taken out of production. Have your students compute the number of acres taken out of production in a month and the number of acres taken out of production each year.

Evaluation

Given data, students will graph information about Minnesota's population and Minnesota's farmland from 1940 to 1980 and project for 1900 and 2000.

Recommended Reference Material

"Minnesota's Ag-Stravaganza" videocassette, available from your Regional Soil and Water Conservation Office. See RESOURCE GUIDE, page 48.

SECTION 4

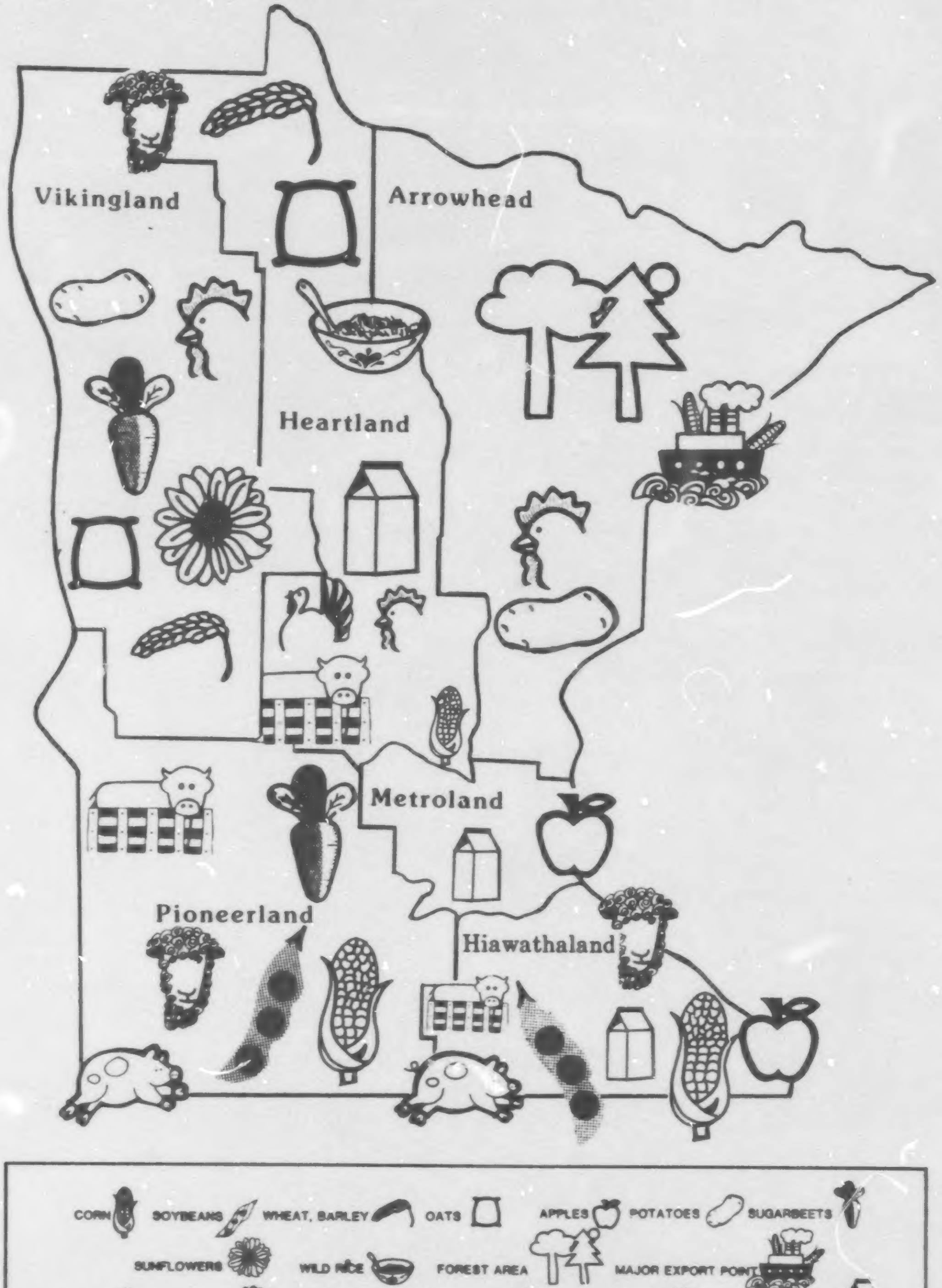
LEARNING PACKET

SOIL PRODUCTIVITY IN MINNESOTA

COMPONENT 13 Minnesota's Soil Produces Much Food (5-6)
COMPONENT 14 Dirt, Who Needs It? (5-6)
COMPONENT 15 Disappearing Farm Land in Minnesota (5-6)

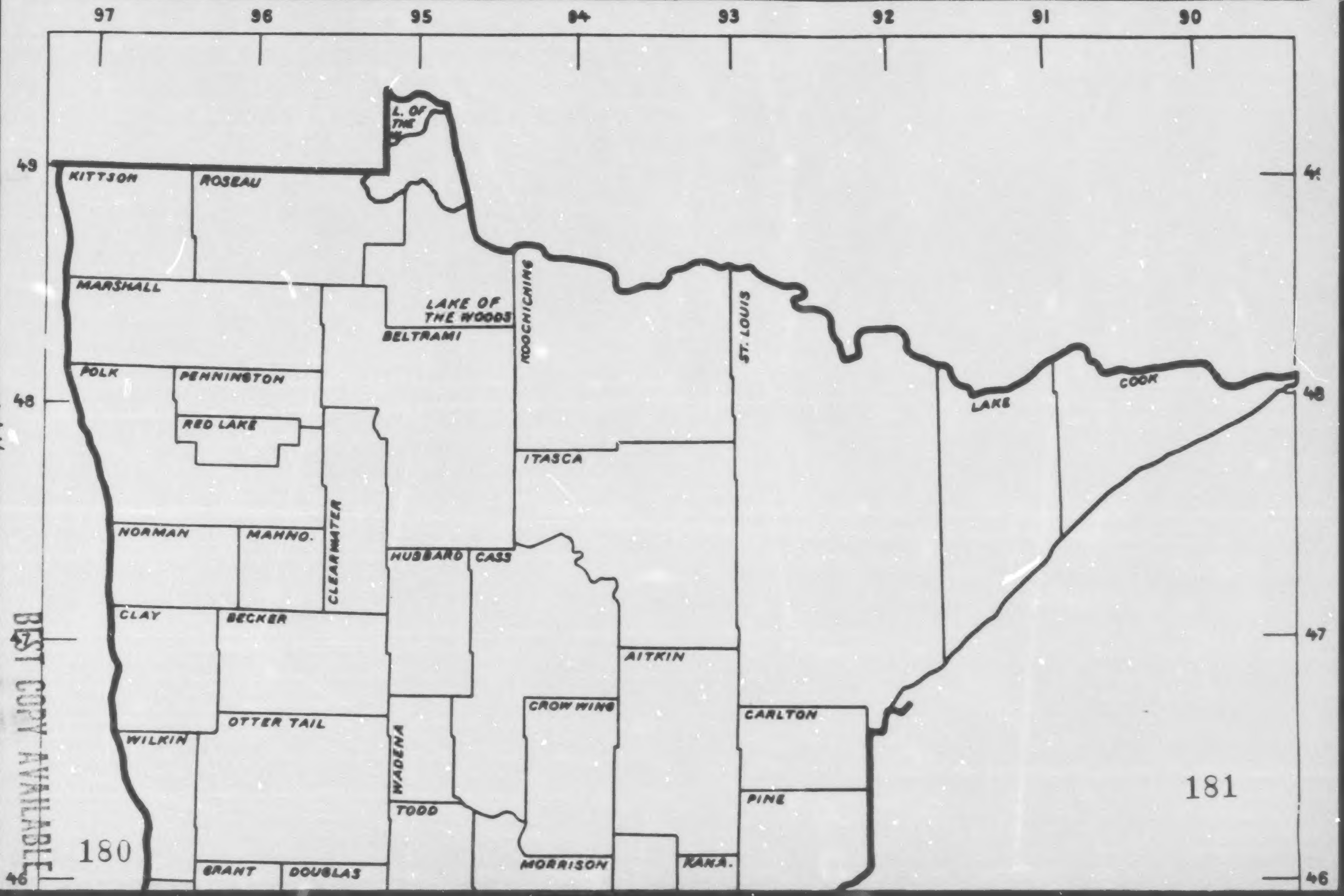
COMPONENT 13
ACTIVITY SHEET A

MINNESOTA'S SOIL PRODUCES MUCH FOOD

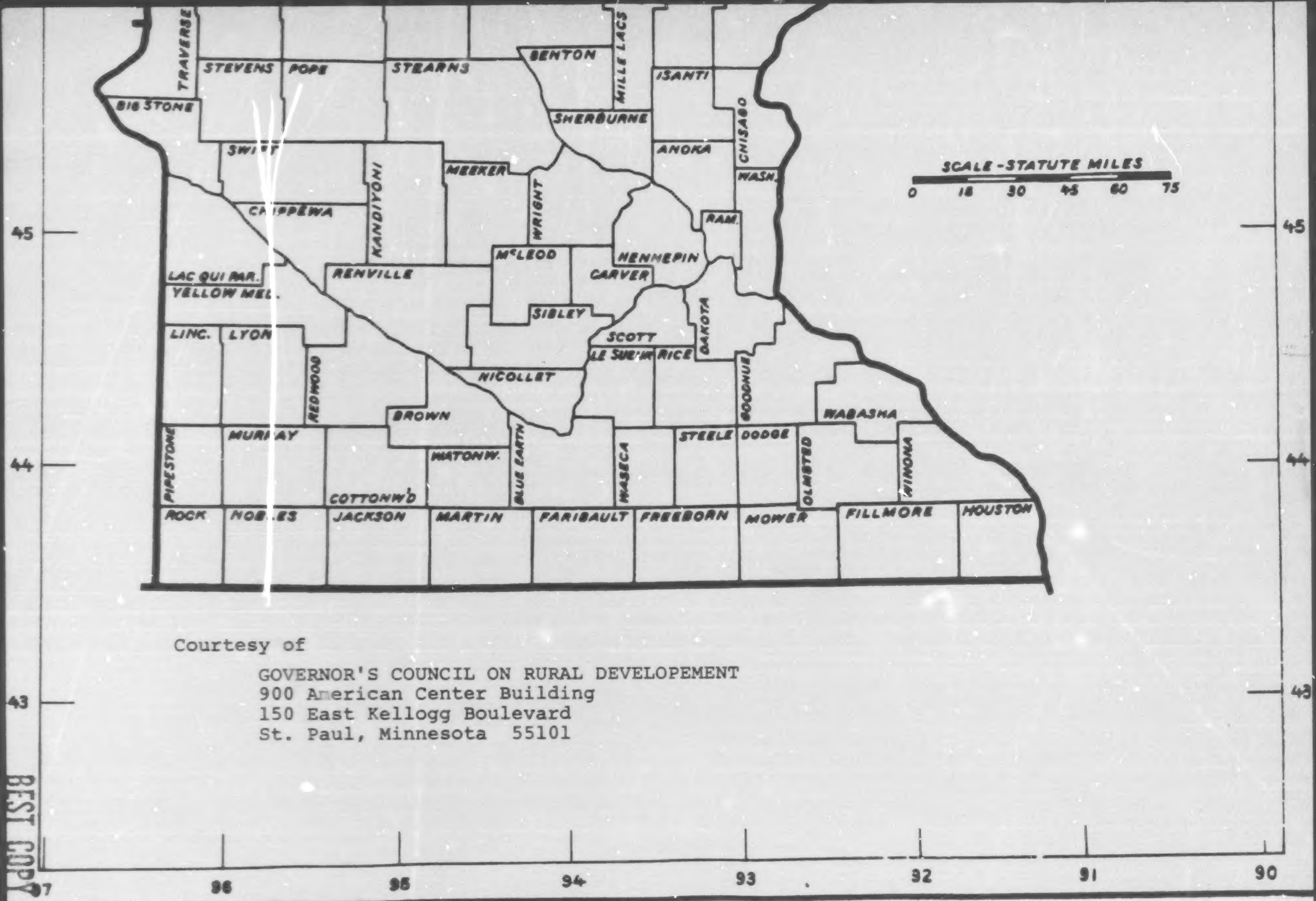

Vikingland
Arrowhead
Heartland
Metroland
Pioneerland
Hiawathaland
CORN
SOYBEANS
WHEAT, BARLEY
OATS
APPLES
POTATOES
SUGARBEETS
SUNFLOWERS
WILD RICE
FOREST AREA
MAJOR EXPORT POINT
TURKEYS
CHICKENS
HOGS
SHEEP
CATTLE
MILK, DAIRY
Vegetables are grown in gardens throughout Minnesota

BEST COPY AVAILABLE

MINNESOTA


97
96
95
94
93
92
91
90
49
48
47
46
L. OF THE
KITTSON
ROSEAU
MARSHALL
LAKE OF THE WOODS
BELTRAMI
KOOCHICHING
ST. LOUIS
POLK
PENNINGTON
RED LAKE
LAKE
COOK
ITASCA
NORMAN
MAHNO.
CLEARWATER
HUBBARD
CASS
CLAY
BECKER
AITKIN
CROW WING
CARLTON
OTTER TAIL
WILKIN
WADENA
TODD
PINE
MORRISON
KANA.
GRANT
DOUGLAS

BEST COPY AVAILABLE


TRAVERSE
STEVENS
POPE
STEARNS
BENTON
MILLE LACS
ISANTI
BIG STONE
SHERBURNE
CHISAGO
SWIFT
ANOKA
KANDIYOHI
MEEKER
WRIGHT
WASH.
CHIPPEWA
RAM.
McLEOD
HENNEPIN
LAC QUI PAR.
RENVILLE
CARVER
YELLOW MED.
SIBLEY
DAKOTA
LINC.
LYON
SCOTT
REDWOOD
LE SUE'R
RICE
NICOLLET
GOODHUE
BROWN
WABASHA
PIPESTONE
MURRAY
STEELE
DODGE
OLMSTED
WATONW.
BLUE EARTH
WASECA
WINONA
COTTONW'D
ROCK
NOBLES
JACKSON
MARTIN
FARIBAULT
FREEBORN
MOWER
FILLMORE
HOUSTON
SCALE - STATUTE MILES
0
15
30
45
60
75
45
44
43
97
96
95
94
93
92
91
90

Courtesy of

GOVERNOR'S COUNCIL ON RURAL DEVELOPEMENT
900 American Center Building
150 East Kellogg Boulevard
St. Paul, Minnesota 55101

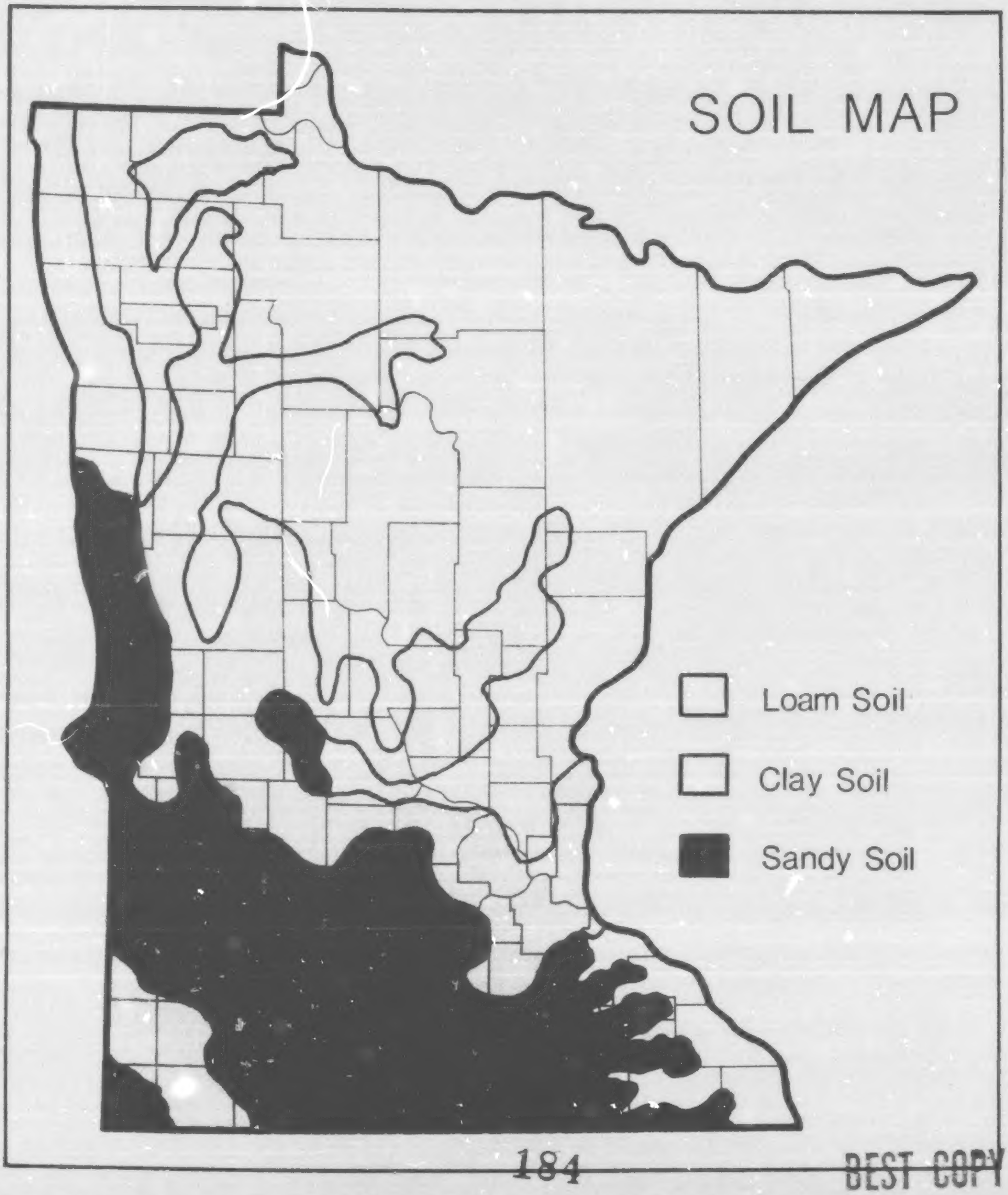
BEST COPY AVAILABL

COMPONENT 13
EXTENDED ACTIVITY SHEET B

MINNESOTA'S SOIL PRODUCES MUCH FOOD

LEARNER OBJECTIVE:

Students will be able to identify where food crops are grown in Minnesota.


SOIL MAP
☐ Loam Soil
☐ Clay Soil
■ Sandy Soil

BEST COPY AVAILABLE

Activity Master 13

Why Conserve Soils?

Objectives

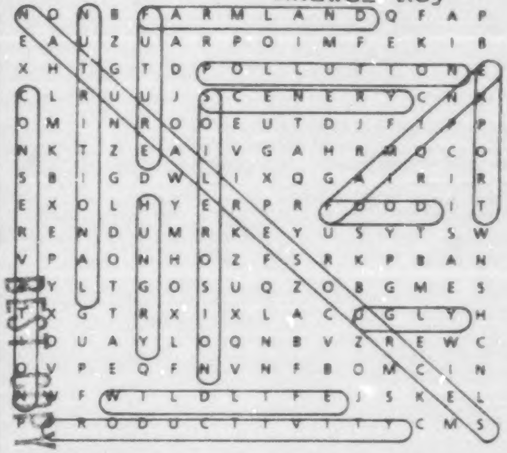
1. Students will tell why soils can be called one of our most valuable resources.
2. Students will categorize reasons for conserving soils as humanitarian, economic, stewardship, environmental, or aesthetic.

Supplies Needed: none

The 15 words at the bottom of the page are hidden in the word puzzle and are used to fill in the blanks of the statements. Each of these statements is a reason we should conserve soils.

List the five categories of soil conservation reasons on the board and explain their meaning to your students. Then have your students categorize each of 15 statements on the activity sheet. Students can place the following abbreviations on the space before each statement: HUM for humanitarian reasons; ECON for economic; STEW for stewardship; ENV for environmental; and AES for aesthetic. It is possible that one reason may fit into more than one category. Ask your students to brainstorm other examples for each of the categories. Conclude this activity by asking the question, "Why can soils be called one of our most valuable natural resources?" Clearly all of the reasons listed on the activity sheet and those brainstormed by your students answer the question.

Answer Key



1. h
2. j
3. k
4. g
5. l
6. o
7. f
8. i
9. m
10. e
11. n
12. a
13. c
14. d
15. b

BEST COPY AVAILABLE

CONSERVING SOIL
Activity Master 13

Why Conserve Soils?

There are 15 words hidden in this puzzle. These words are listed below. Try to find as many as you can. You can circle them across, down, and diagonally. The letters of each word are always in order. Then use the letter of the correct word to fill in the blank in these statements.

N	O	N	B	F	A	R	M	L	A	N	D	Q	F	A	P
E	A	U	Z	U	A	R	P	O	I	M	F	E	K	I	B
X	H	T	G	T	D	P	O	L	L	U	T	I	O	N	E
C	L	R	U	U	J	S	C	E	N	E	R	Y	C	N	K
O	M	I	N	R	O	O	E	U	T	D	J	F	I	P	P
N	K	T	Z	E	A	I	V	G	A	H	R	M	Q	C	O
S	B	I	G	D	W	L	I	X	Q	G	A	I	R	I	R
E	X	O	L	H	Y	E	R	P	R	F	O	O	D	I	T
R	E	N	D	U	M	R	K	E	Y	U	S	Y	T	S	W
V	P	A	O	N	H	O	Z	F	S	R	K	P	B	A	N
A	Y	L	T	G	O	S	U	Q	Z	O	B	G	M	E	S
T	X	G	T	R	X	I	X	L	A	C	U	G	L	Y	H
I	O	U	A	Y	L	O	Q	N	B	V	Z	R	E	W	C
O	V	P	E	Q	F	N	V	N	F	B	O	M	C	I	N
N	W	F	W	I	L	D	L	I	F	E	J	S	K	E	L
P	P	R	O	D	U	C	T	I	V	I	T	Y	C	M	S

___ 1. Soils are one of our most valuable ____.

___ 2. Severe soil erosion can lead to water ____.

___ 3. Soil ____ must be kept high to produce all of the food we need.

___ 4. People in many developing nations would be ____ without food aid from the U.S.

___ 5. Prosperous, productive farms provide us with beautiful ____ as we travel along our nation's highways.

___ 6. Windbreaks and other soil conservation practices create homes for birds, rabbits, foxes, and other kinds of ____.

___ 7. The ____ depends upon productive soils.

___ 8. U.S. food aid helps meet the ____ needs of many people in developing nations.

___ 9. More than 40 years after the Dust Bowl era, ____ is still a national challenge.

___ 10. Soil erosion can increase the price of the ____ that we eat.

___ 11. Mudslides, gullies, and muddy water are ____ to look at.

___ 12. Soil ____ is an important part of prosperous farming.

___ 13. ____ occurs when there are severe food shortages in an area.

___ 14. Every day, more and more ____ is lost to non-agricultural use.

___ 15. Food is a major ____ that we sell to nations around the world.

a. conservation
b. export
c. famine
d. farmland
e. food
f. future
g. hungry
h. natural resources
i. nutritional
j. pollution
k. productivity
l. scenery
m. soil erosion
n. ugly
o. wildlife

Activity Master 16

Matching Land Use with Soils

Objectives

1. Students will examine a simplified soil map and observe soil types.
2. Students will search for examples of problems that were created because land use was not properly matched with soil types.
3. Students will evaluate a land use suggestion,given soil types on a simplified soil map.

Supplies Needed: colored transparency markers

Describe for your students examples of problems that can result from not matching land use with the proper soils. Ask your students to search for similar examples in the newspaper or in their community.

Project Transparency 3, A Soils Map. Point out the cardinal points on the map. Also point out the town and buildings, rivers, and other land features on the map. The soil types are shown in red. Once your students are accustomed to reading the soil map, have them work on Activity Master 16.

Emphasize that soils are a limiting factor in using the land. Obtain a soil survey for your county. Show it to the class and describe its use. Have students search for their homes on the map.

Possible answers include:

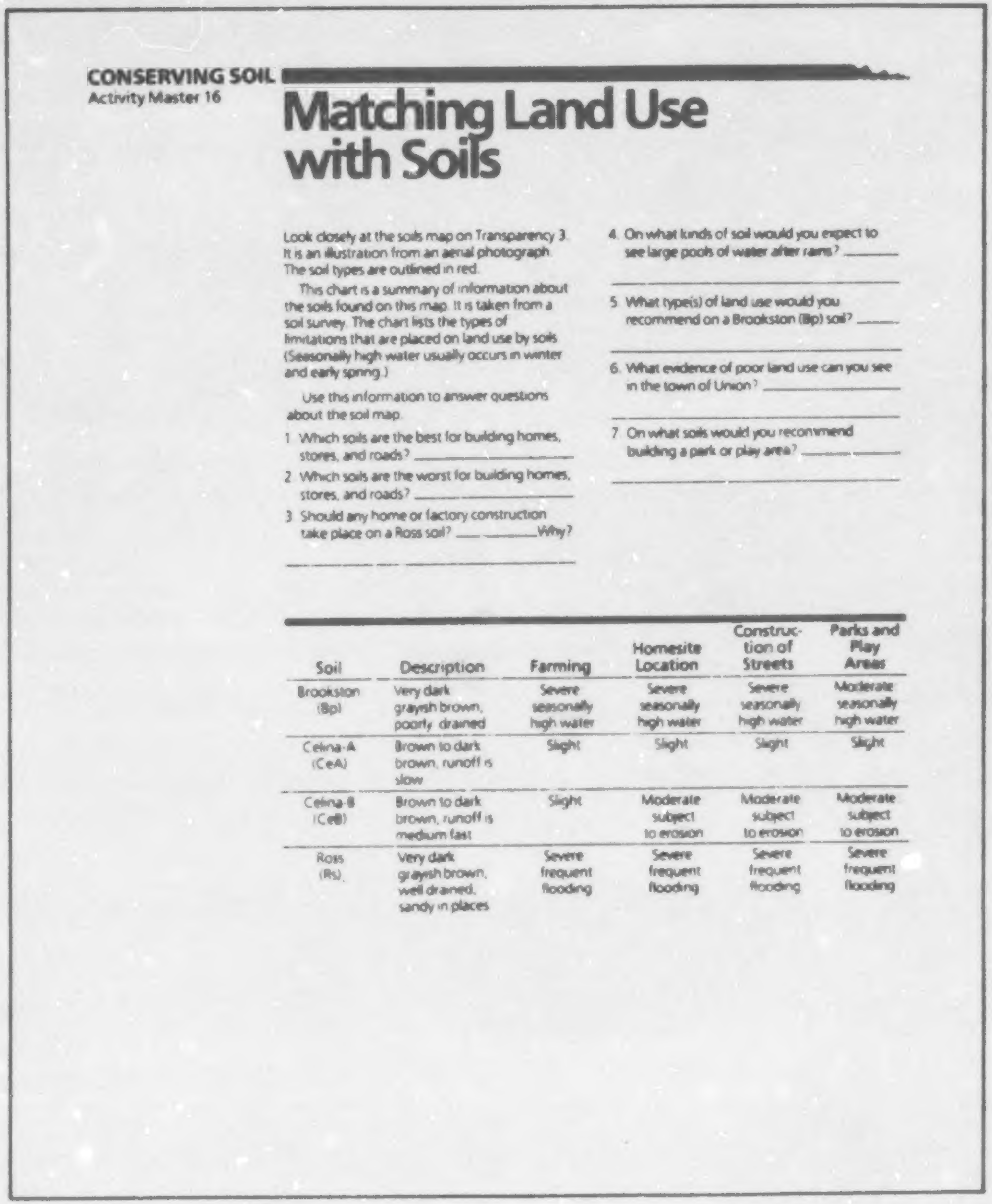
1. Celina-A and Celina-B
2. Brookston and Ross
3. No. Because it is subject to frequent flooding.
4. Brookston and Ross
5. Farming or a park or play area
6. Homes in the southern part of Union are built on the Ross and Brookston soils,which have severe limitations for homesite location.
7. Celina-A and Celina-B. Brookston and Ross if buildings are placed on higher ground.

Conclude the lesson by stating that Union wants to expand west into the land across route 48. People want new homes, stores, and a park.

Ask a volunteer to shade the areas on the transparency where they would put homes and shops (on the Celina-B soil). Then have a volunteer draw parallel lines on the transparency where they would put the park (on the Brookston soil).

Note: The chart from this activity sheet will be needed for Activities 17 and 18

BEST COPY AVAILABLE



CONSERVING SOIL
Activity Master 16

Matching Land Use with Soils

Look closely at the soils map on Transparency 3. It is an illustration from an aerial photograph. The soil types are outlined in red.

This chart is a summary of information about the soils found on this map. It is taken from a soil survey. The chart lists the types of limitations that are placed on land use by soils. (Seasonally high water usually occurs in winter and early spring.)

Use this information to answer questions about the soil map.

1. Which soils are the best for building homes, stores, and roads? ______
2. Which soils are the worst for building homes, stores, and roads? ______
3. Should any home or factory construction take place on a Ross soil? ______ Why? ______
4. On what kinds of soil would you expect to see large pools of water after rains? ______
5. What type(s) of land use would you recommend on a Brookston (Bp) soil? ______
6. What evidence of poor land use can you see in the town of Union? ______
7. On what soils would you recommend building a park or play area? ______

Soil	Description	Farming	Homesite Location	Construction of Streets	Parks and Play Areas
Brookston (Bp)	Very dark grayish brown, poorly drained	Severe seasonally high water	Severe seasonally high water	Severe seasonally high water	Moderate seasonally high water
Celina-A (CeA)	Brown to dark brown, runoff is slow	Slight	Slight	Slight	Slight
Celina-B (CeB)	Brown to dark brown, runoff is medium fast	Slight	Moderate subject to erosion	Moderate subject to erosion	Moderate subject to erosion
Ross (Rs).	Very dark grayish brown, well drained, sandy in places	Severe frequent flooding	Severe frequent flooding	Severe frequent flooding	Severe frequent flooding

Activity Master 22

Soil Pollution from Hazardous Chemicals

Objectives

1. Students will summarize why hazardous chemicals are so persistent in soils.
2. Students will describe how to prevent hazardous chemical pollution in their backyard, schoolyard, or other designated area.

Supplies Needed: warning labels from household products

To begin the activity, ask students to read the introductory material on the activity master. List the categories of hazardous chemicals on the board and ask students to give examples of each. Explain the term toxic and why it means more than poisonous. Then explain why they are persistent in soils, and how soils can become polluted. Next, have your students survey their homes for products that are hazardous. They should look for labels that contain words such as Caution, Danger, and Warning. Students should list these products on the activity master and then write the message from a warning label that they found. Discuss the need for such labels and the type of information that is on warning labels. Also mention that there are safer alternatives to many chemicals. Have your students research biological control of pests and other alternatives.

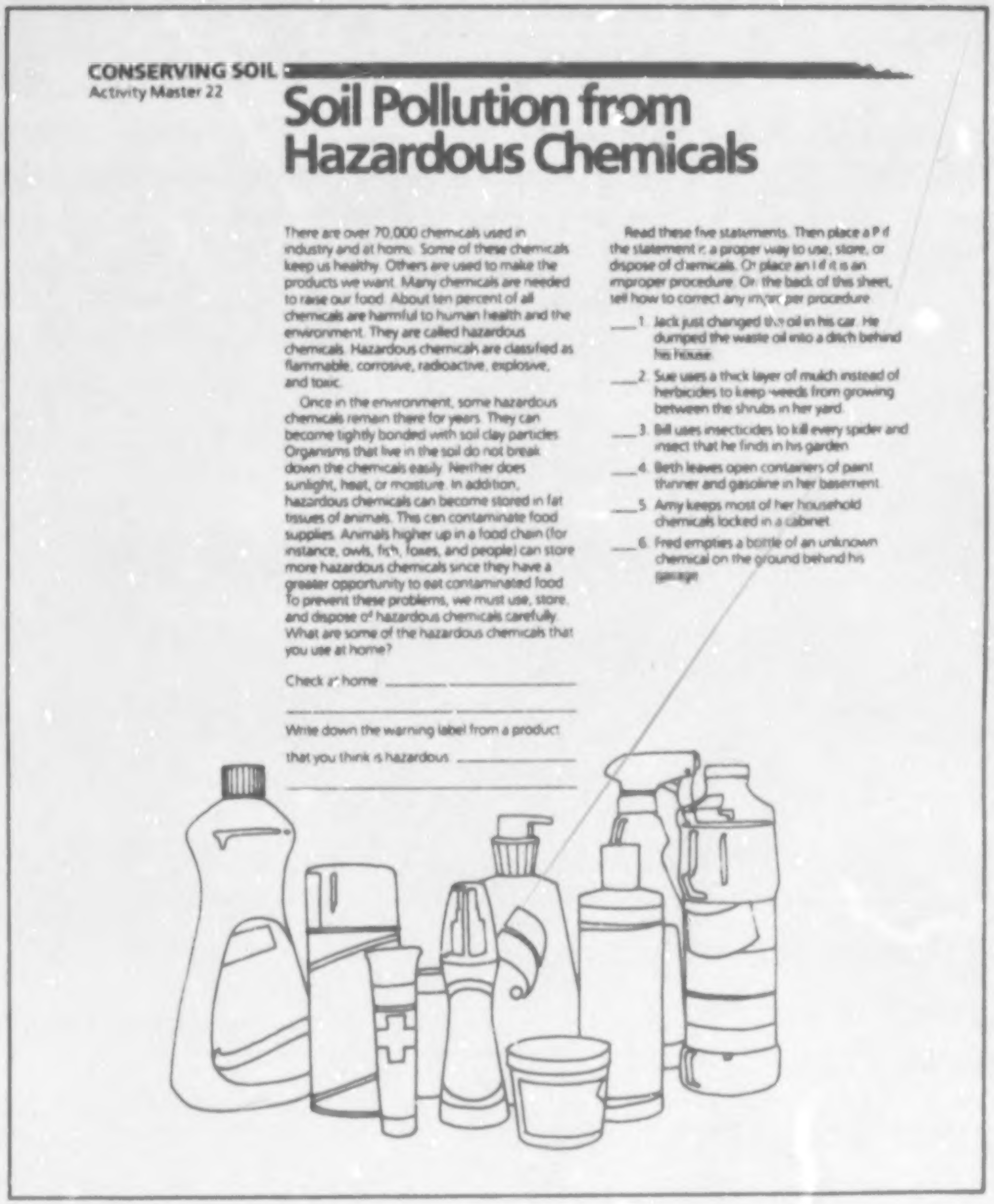
Calling on their background and experience, students will be able to evaluate the statements on the bottom of the activity master.

Television news programs and newspapers quite often cover a transportation accident that has resulted in a spill of hazardous chemicals. Have your students search for such news events and then report them to class. The class can also research what can be done to prevent such damages from occurring in the future.

Answer Key

1. I
2. P
3. I
4. I
5. P
6. I

BEST COPY AVAILABLE



CONSERVING SOIL
Activity Master 22

Soil Pollution from Hazardous Chemicals

There are over 70,000 chemicals used in industry and at home. Some of these chemicals keep us healthy. Others are used to make the products we want. Many chemicals are needed to raise our food. About ten percent of all chemicals are harmful to human health and the environment. They are called hazardous chemicals. Hazardous chemicals are classified as flammable, corrosive, radioactive, explosive, and toxic.

Once in the environment, some hazardous chemicals remain there for years. They can become tightly bonded with soil clay particles. Organisms that live in the soil do not break down the chemicals easily. Neither does sunlight, heat, or moisture. In addition, hazardous chemicals can become stored in fat tissues of animals. This can contaminate food supplies. Animals higher up in a food chain (for instance, owls, fish, foxes, and people) can store more hazardous chemicals since they have a greater opportunity to eat contaminated food. To prevent these problems, we must use, store, and dispose of hazardous chemicals carefully. What are some of the hazardous chemicals that you use at home?

Check at home ________ ________________

________________ ________________

Write down the warning label from a product

that you think is hazardous ________________

____

Read these five statements. Then place a P if the statement is a proper way to use, store, or dispose of chemicals. Or place an I if it is an improper procedure. On the back of this sheet, tell how to correct any improper procedure.

____1. Jack just changed the oil in his car. He dumped the waste oil into a ditch behind his house.

____2. Sue uses a thick layer of mulch instead of herbicides to keep weeds from growing between the shrubs in her yard.

____3. Bill uses insecticides to kill every spider and insect that he finds in his garden.

____4. Beth leaves open containers of paint thinner and gasoline in her basement.

____5. Amy keeps most of her household chemicals locked in a cabinet.

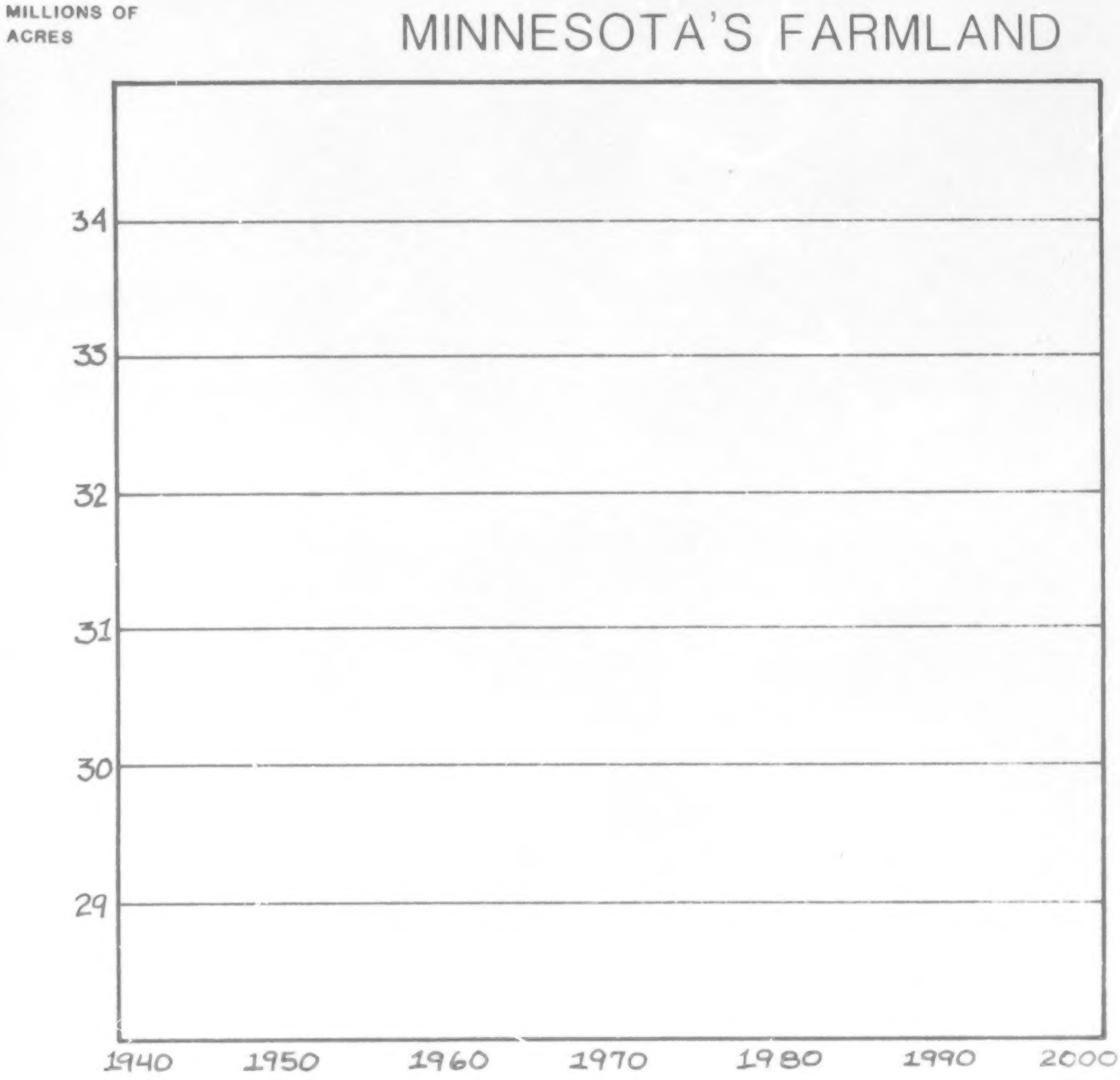
____6. Fred empties a bottle of an unknown chemical on the ground behind his garage.

COMPONENT 15
ACTIVITY SHEET A

DISAPPEARING FARMLAND IN MINNESOTA

LEARNER OBJECTIVE:

Students will be able to compare the relationship between disappearing farmland and the population's food needs in Minnesota from 1940 - 2000.



MINNESOTA'S FARMLAND

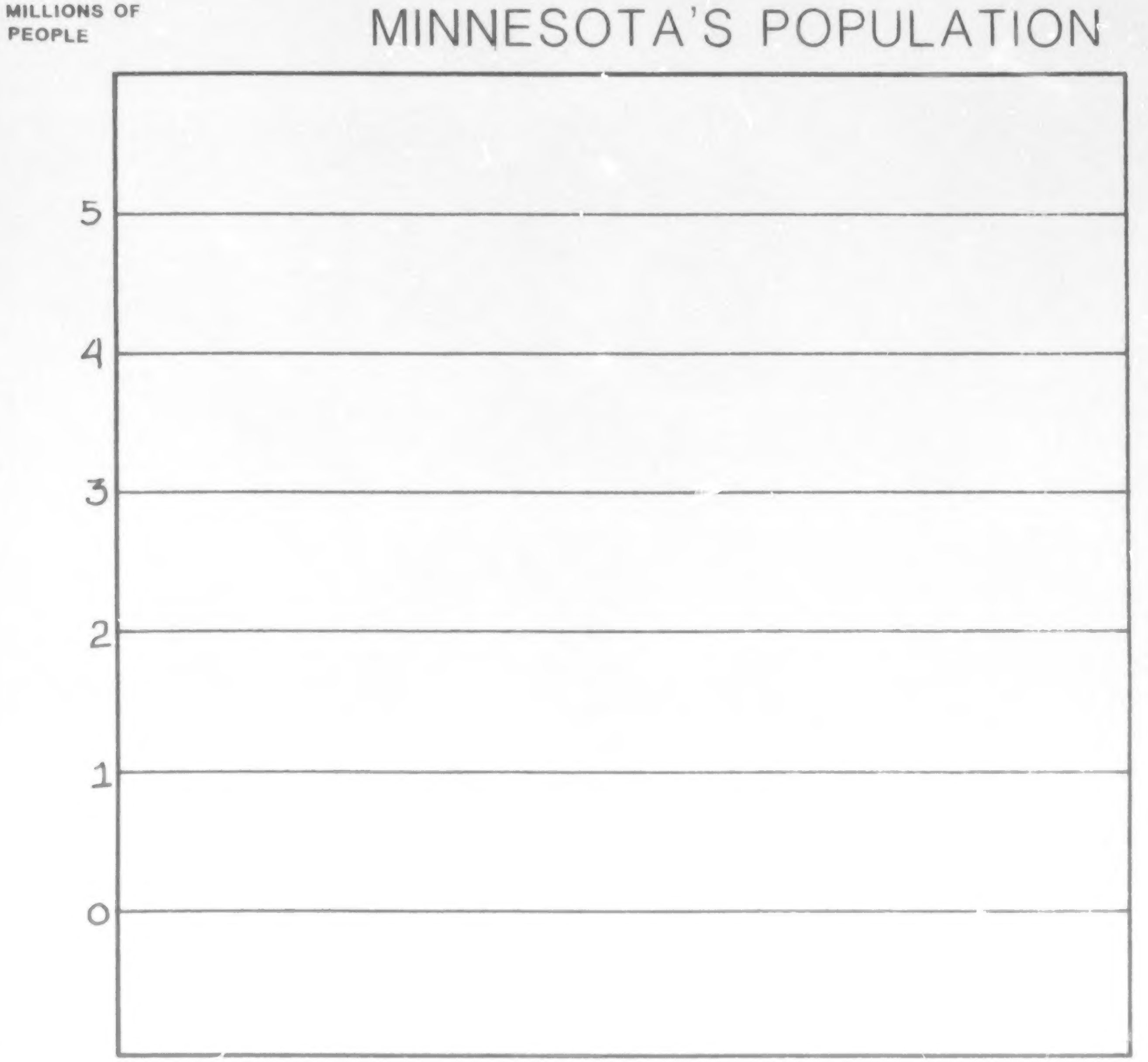
	1940	1950	1960	1970	1980	1990	2000
MILLIONS OF ACRES	32.7	33.3	32.4	30.9	30.00	?	?

COMPONENT 15
ACTIVITY SHEET B

DISAPPEARING FARMLAND IN MINNESOTA

LEARNER OBJECTIVE:

Students will be able to compare the relationship between disappearing farmland and the population's food needs in Minnesota from 1940 - 2000.



MINNESOTA'S POPULATION

	1940	1950	1960	1970	1980	1990	2000
MILLIONS OF PEOPLE	2.79	2.92	3.41	3.81	4.07	?	?

SECTION 5

PLANNING FOR WISE USE OF LAND

ACTIVITIES

- Filmstrip On Land Use
- Role-playing Land Uses
- Simulation of Zoning Procedures

WHICH AGRICULTURAL LAND

Should Be Kept As Cropland,
Grassland, Forest, Wetlands

WHICH AGRICULTURAL LAND

Could Be Developed For
Residential, Commercial, Industrial or
Public Use

Governor's Council on Rural Development

GCRD

SECTION 5
TEACHING PACKET

PLANNING FOR WISE USE OF LAND

COMPONENT 16	Farm Land Is Lost (K-3)
COMPONENT 17	You've Got Me Covered (4-6)
COMPONENT 18	Land Use; Whose Responsibility? (6)

FARMLAND IS LOST

AGE: Grades 2-4
SUBJECT: Social Studies
SKILLS: Analysis, application, comparison and contrast, description, discussion, drawing, evaluation, generalization, observation, visualization
DURATION: 30-40 minutes
GROUP SIZE: Any
SETTING: Indoors
KEY VOCABULARY: Cropland, drainage, forestland, pastureland, wetlands. See Illustrated Vocabulary.

Description

Students will discuss and then draw pictures of different land uses.

Learner Objective

Students will be able to demonstrate an understanding of the need and responsibility to use land and water wisely.

Background

See Curriculum Framework V, pages 4, 5, and 6.

Everyone needs food, clothing, and shelter. Land and water produce these basics of life. The land produces food for people and animals. Animals give us food and clothing (meat, oil, wool, leather, etc.). The land also provides shelter for people and animals (wood, marble, clay for bricks). The land provides some of our clothing (cotton, flax).

Materials

- 12" x 18" drawing paper
- Magazine pictures of various kinds of land use; forestlands, croplands, pasturelands, wetlands, housing, schools, shopping areas, factories, wildlife, waste disposal, mining, gravel pits.

Activity

1. Show the pictures. Have students tell what kind of land use they see on each picture. Stress the need to plan for the use of land.
2. Ask students such questions as:
   a. What could happen if too many trees are cut down? (No shade, no place for birds to live, no roots to hold down soil.)
   b. What could the trees be used for if cut down?
   c. What could happen if a swamp area is used for a factory? (No more birds, trees. Probably problems with drainage, flooding.)
   d. What if the whole neighborhood is covered with houses, factories, airports, shopping centers? (No place left to grow food; little space for water to sink in so flooding could occur.)

e. Why might it be important to keep some land as pastureland? (Grazing areas, parks, habitat for wildlife. Also, plowing up dry pasture areas could be potential areas for wind erosion damage.)

3. Pass out 12" x 18" paper to each student. Fold paper in half. On the top half draw your town or farm as you think it was when the Indians were here. Draw it as you see it now.
4. Share the pictures. Tell what is good about the way the land is used now. Tell what is not good about the way the land is used now.

Evaluation

Given an opportunity to discuss past and present land uses, students will draw and share pictures about the way land is used now.

YOU'VE GOT ME COVERED

AGE: Grades 4-6
SUBJECT: Social Studies
SKILLS: Analysis, application, comparison and contrast, description, discussion, evaluation, generalization, observation, public speaking, visualization
GROUP SIZE: Large and small groups
KEY VOCABULARY: Commercial development, cropland, forest land, grassland, industrial development, planning commission, public development, residential development, wetlands. See Illustrated Vocabulary.
LEARNING PACKET: Activity Sheet

Description

Students will view the "Land Use" filmstrip and complete the chart on the various uses of land.

Learner Objective

Students will be able to list what can be found in each land use category.

Background

See Curriculum Framework V, pages 4, 5, and 6.

Agricultural land is divided into four categories: cropland, grassland, wetlands, and forestland.

Land that is developed is divided into four categories: commercial development (shopping areas), industrial development (factories), residential development (homes), and public development (parks, schools).

City, township, and county planning commissions are struggling now to determine priorities for the use of land. Which land will be preserved as agricultural land? as wetland? as forested areas? Which land could be used for housing? for factories? for parks? Once land is covered with asphalt and cement and buildings, can it be converted back to land for growing crops? Careful planning is necessary for the wise use of our land resources.

Planning focuses on using land and water wisely. Planning Commissions exist to serve us and to protect land and water for future generations.

Materials

- "Land Use," a six-frame filmstrip of forestlands, croplands, pasturelands, wetlands, commerical development, residential development, public development, and industrial development is available from your Regional Soil and Water Conservation Offices. See RESOURCE GUIDE, page 48.
- Component 17 Activity Sheet from the Learning Packet

Activity

1. Using Component 17 Activity Sheet, ask your students to list what could be found in each land use category. Remind them to include plants, birds, animals, building, etc.
2. As students view the filmstrip, the following questions may serve as a guide for each frame.
   a. Frame 1 - Wetlands and Pasture
      1) What do you see in this picture? (Wetlands, pasture, slopes, trees, home in the country.)
      2) What good are wetlands? (Store water in time of flood, reduce erosion, source of water for groundwater reservoirs, help to purify water, habitat for wildlife.)
      3) Is it good to drain wetland? Why? (Provide more cropland, take away wildlife habitat, develop the area for parks or other development.)
      4) What about that home up on the hill? Is it a farm house? (No farm buildings so maybe it's just a country home.)
      5) Is it a good idea to have a country home?
      6) What if there were lots of people who wanted country homes and they didn't like the smell of the nearby farms or the dust from the gravel road? (May have been built on good agricultural soil, or may have been built on poorer soil or in a wooded area. Oftentimes country homes have large lots, with anywhere from a couple of acres to as much as five or ten acres. May not like the smell from the nearby farm and consequently may try to place restrictions on the farming operation. May seek to have road paved to reduce dust. This would raise taxes not only for the homeowner but also the farmer who doesn't need a paved road.)
      7) What is the pasture used for?
      8) Does the pasture have soil as good as a corn field?
      9) What would happen if someone wanted to grow corn on the pastureland? (Soil not as fertile, soil may be rocky, water table may be too high, sometimes too hilly.)
   b. Frame 2 - Erosion
      1) What's going on in this picture? (Erosion of slope, small stream.)
      2) What is causing the erosion? (Grass has been removed from slope, perhaps by overgrazing, by the stream during periods of heavy rainfall or extensive snow melt.)
      3) What happens to the water when erosion occurs? (Water becomes cloudy with silt and animal waste, stream may pollute nearby lake or wetland, wetland becomes filled with silt and eventually no longer a wetland.)
      4) What could be done to prevent this type of erosion? (Don't allow the land adjacent to the stream to become overgrazed, especially the

slopes, plant grass or other ground cover on the slopes or don't remove all the trees).

c. Frame 3 - Housing Development
   1) What kind of development do you see here? (Housing, which we call a residential use; large lots of approximately two-and one-half acres.)
   2) Where might this be located? (In a rural area; in an urban fringe area adjacent to a city.)
   3) What do you think the land was used for before? (Looks like it might have been farmland; probably corn or beans grew on it at one time or maybe sunflowers.)
   4) Is this a good use of the land? Why or why not? (We need houses to live in; it would be nice to have a large house on a large lot; large lots use up a big piece of land; land that once may have been used to grow crops; large lots are expensive to provide with public services such as streets, sidewalks, water, sewers, etc.)
   5) Would it be better to make the lots a little smaller so that more people could live on the same piece of land? How small should the lots be? (Less land needed; less agricultural land taken out of production; taxes would be less because services would be less.)

d. Frame 4 - Public Use
   1) Is there any reaction to this use? What is it? (School, public use, taxes.)
   2) What is that growing adjacent to the school? (Corn; area was once agricultural land.)
   3) Is it good to build a public building on agricultural land? (Usually agricultural land is also the best land for development; sometimes it's cheaper to buy land on the edge of the city than inside the city.)
   4) What other kinds of public use can you think of? (Parks, libraries, post office, city hall, courthouse, church.)
   5) Do public buildings have any more right to build on good agricultural land than other buildings such as houses or stores? Why or why not?

e. Frame 5 - Manufacturing Plant
   1) What is this use of the land? (manufacturing plant)
   2) Where is it located? (Good agricultural land under the snow; edge of the city.)
   3) Why did the city want this manufacturing plant? (Contributes more taxes to the city government; provides more jobs for city residents; bring more money to other businesses in the city; help the city continue to grow; make products that people need.)
   4) What problems do manufacturing plants contribute to the community? (Sometimes more pollution, noise, etc.)
   5) How would you treat the location of this manufacturing plant if you were the mayor of the

city? (Need to look at other possible locations and try to choose the best one; need to decide how important the new jobs are; how much will it cost the city to build new roads, add more police and firemen, and improve the sewage plant; will the taxes contributed pay for all these services; maybe this site will take less of the very best agricultural land than another site.)

f. Frame 6 - Highways
   1) What kind of highway is this? (Interstate or freeway.)
   2) How is this highway different than other highways? (No stop signs; usually four lanes; don't meet other cars; wide.)
   3) What's that? (Cloverleaf - instead of turning a corner to go another direction or to get on another highway people use a cloverleaf.)
   4) Does the cloverleaf use a lot of land? (Sometimes as much as it takes to make several football fields; usually in rural areas it is agricultural land as it is in this picture.)
   5) What are some of the benefits of the freeway? (Gets places faster; fewer traffic jams; safer than regular highways; products can be shipped to their destination faster than regular highways.)
   6) What are some of the disadvantages? (Very expensive to build; sometimes it is necessary to remove house and stores so that they can be built; they need a lot of land to build a freeway and sometimes this land is our very best agricultural land.)

3. After the filmstrip is shown, ask your students to add to their activity sheet list.
4. Discuss the problems that could arise as agricultural land is developed.

Evaluation

Given a filmstrip and an opportunity for discussion as background, students will list what can be found in each land use category.

Recommended Reference Material

"Minnesota's Ag-Stravaganza" videocassette, available from your Regional Soil and Water Conservation Office. See RESOURCE GUIDE, page 48.

Extended Activity

Have the County Planning and Zoning Administrator talk to your class about what is being done to protect agricultural land and guide the wise use of land resources in your county.

Other resource people could include: U.S.D.A. Soil Conservation Service, Agricultural Extension Service, Soil and Water Conservation District, Regional Development Commission, City or Township Planning Commission members. See RESOURCE GUIDE, pages 20, 47, 49, and 53.

LAND USE: WHOSE RESPONSIBILITY?

AGE: Grade 6
SUBJECT: Social Studies, Language Arts
SKILLS: Analysis, application, comparison and contrast, description, discussion, evaluation, generalization, observation, problem solving, public speaking
DURATION: About three class periods
GROUP SIZE: 20-30 students
KEY VOCABULARY: Planning commission, topography, zoning. See Illustrated Vocabulary.
LEARNING PACKET: Activity Sheets A, B, C
SOURCE: "A Land Use Simulation," Investigating Your Environment Series, (Portland Orgeon: U.S.D.A. - Forest Service, 1975)

Description

After being given background information, students will assume roles that correspond to the functioning of a public hearing on zoning.

Learner Objective

Students will be able to discover the need for trade-offs in using land and identify the need for zoning procedures to protect agricultural land.

Background

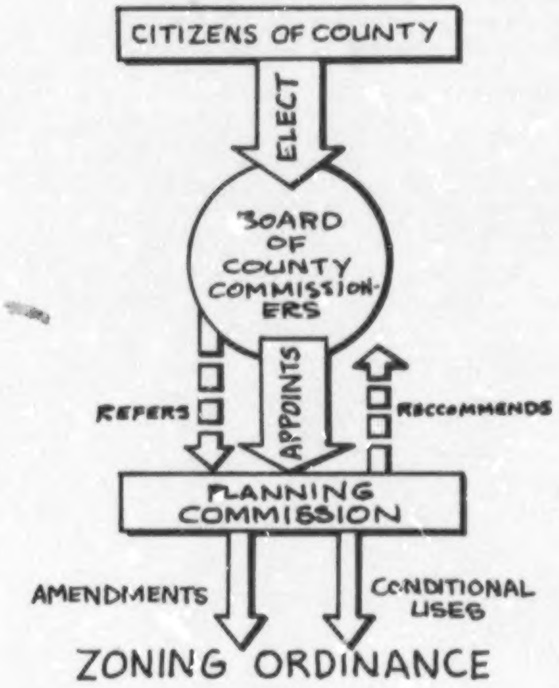
See Curriculum Framework V, pages 4, 5, and 6.

Simulations are operating models of real life situations. They may be about physical or social situations. Most simulations for classroom use involve role playing - the roles being acted out to correspond to the functioning of some real process or system.

In this simulation, students interact with each other in the decision-making process.

Where there is a planning commission, land is designated for use through zoning. The zones include: agricultural forestry, recreation, residential, lakeshore, industrial, commercial, flood plain, and special purpose (airports, parks, etc.).

A planning commission, through public hearings, can recommend to a higher authority, usually a Board of County Commissioners or a City Council, to change or maintain a zoning ordinance for a specific piece of land.



Materials

- Component 18 Activity Sheets A, B and C
- An enlarged map of Centerplace, U.S.A., drawn from Component 18 Activity Sheet A, "Centerplace City Land Use Problem" from Learning Packet
- Optional: "Minnesota's Ag-Stravaganza, a video tape (12 minutes). Available through the Soil and Water Conservation office. See RESOURCE GUIDE, page 48.

Activity

Preparation

1. Show "Minnesota's Ag-Stravaganza" video-tape if your students need background about the importance of protecting land for agricultural purposes.
2. Write LAND USE across the chalkboard and ask for a definition.
3. Distribute Component 18 Activity Sheet A, "Centerplace City Land Use Problem."

After reading the case study, ask the students to list the possible uses of the land on Activity Sheet A.

4. When most students have started to write down uses, brainstorm with the class by asking the following questions:
   a. Who would want this land?
   b. What would they do with the land?

As students respond, write all comments on the board. Students may also add to their own Component 18 Activity Sheet A, "Center Place City Land Use Problem." (strip mining, farmer, developer, factory, stores, power plant, park, recreation area, wildlife preserve, library, zoo, school, etc.)

5. After students have supplied a list, ask:
   a. In planning to sell the land, what might be the concerns the owner would have about the land? (good price, pollution, neighbors, rezoning)
   b. Who should be responsible for determining the best use of land? (owner, buyer, everyone, government, outside agency, neighbors)
6. Using the Curriculum Framework and BACKGROUND information provided, introduce the function of a planning commission. (Or bring in a member of your local planning commission.)

Include the work plan of a planning commission. This could be related to the "work plan" a student might use in completing a specific task. (Cleaning a bedroom.)

Work Plan of a Planning Commission:

1) Identifying the problems
2) Listing the goals
3) Preparing work tasks

Since the function of a planning commission is to make recommendations (See the flowchart under

BACKGROUND), interested parties can meet with the planning commission to present their case and try to influence a decision. A planning commission can recommend to change or maintain the zoning ordinance for a specific piece of land if they feel it is in the best interest of the community.

7. Referring to the Component 18 Activity Sheet A, "Centerplace City Land Use Problem," ask your students to:
   a. Identify the problems of Centerplace (increasing population, demands for housing, etc.).
   b. List possible goals of the planning commission for Centerplace, in order of priority. (More housing, more jobs, or preserving the land for agricultural purposes.)
   c. List specific work tasks that could help to reach these goals. (rezone land to encourage business, etc., maintain present agricultural zoning ordinance.)

Role-playing

1. Review the case study and the function of a planning commission.
2. Prepare for role-playing by dividing the class into groups (4-6 students).
3. Designate one group as the planning commission. Tell them they will be responsible to hear presentations and decide upon the best one. The planning commission should first review the problems and goals of Centerplace (as set up in class), and write up a list of questions to ask prospective land buyers. They should then:
   a. Develop the criteria they will use in evaluating the proposals.
   b. Develop a system to record and evaluate their assessment of each presentation.

   Component 18 Activity Sheet B, "Planning Commission" will aid in these activities.
4. Assign the other groups to one of the land use categories discussed under Preparation #4. (One group could represent a nuclear power plant, one group could represent a farmer*, one group could represent a shopping mall owner, etc.)

   *The farmer would want to maintain the present zoning ordinance for agricultural use.
5. To these groups, pass out Component 18 Activity Sheet C, "Presentation Preparation." Have the students list and analyze the advantages and disadvantages for their proposed land use. (Allow about 10 minutes.)
6. After compiling a list, each groups task is to develop a three minute presentation to the planning commission. They should include:
   a. reasons for wanting the land,
   b. how it would benefit the community,
   c. and the price they would pay.

   (Remind them to consider such things as proper use of land, sewage, water, electricity, health, safety, taxes, economics, needs of the community, roads...)

   They may use the large map of Centerplace during their presentation. More than one person in each group must participate in making the presentation.
7. When all groups are ready, have the planning commission sit at the front. The large map of Centerplace should be taped near the planning commission so that groups can refer to it during their presentation.

Appoint a time-keeper to cut off all presentations at three minutes. Have the chairperson make the three announcements listed at the bottom of Component 18 Activity Sheet B, "Planning Commission."

8. When all presentations have been given, the planning commission will deliberate (5-10 minutes) to select the best proposal and to decide if there will or will not be a change in zoning.
9. While the planning commission is meeting, the class could develop a list of criteria which they think should be used by the commission in making their decision.
10. After deliberating, the planning commission should read their criteria aloud and announce their decision as to what recommendation will be given to the Board of County Commissioners. Their reasons for the decision should also be given.

Follow-up Discussion Questions

1. What additional information would you like to have had for planning your group's presentation?

   List on board (e.g., Topography, vegetation, economy of area, railroad, shopping center, adjacent land, climate, soil survey, historical information, flood plain, wildlife, interest of Board of County Commissioners, money available, educational needs, regulations by State, political climate).
2. Where would you go to collect information on these topics?

   Point out to the group that this is one of the most important parts of the activity, because it emphasizes that we need a variety of information and data before we can intelligently make a land management or environmental decision to BEST meet the needs of people and their environment.

Optional Follow-Up Discussion Questions

1. Did new leadership emerge during this session? What factors enabled this to happen?
2. Did your group work as a team? What did your group do to insure participation by all members of the group?
3. Were you assigned to a group or interest you didn't want to represent? How did you feel? Point out that many times we overlook that other people have different needs and ideas and this might be a way to identify them.

Evaluation

Given an opportunity to participate in a simulation, students will assume roles that correspond to a public hearing on zoning.

Recommended Reference Material

"Land Use: Whose Responsibility?" video tape showing how this lesson developed in a classroom setting. This was produced for teacher background and is available from the Governor's Council on Rural Development. See RESOURCE GUIDE, page 48.

SECTION 5

LEARNING PACKET

PLANNING FOR WISE USE OF LAND

COMPONENT 16	Farm Land Is Lost (K-3)
COMPONENT 17	You've Got Me Covered (4-6)
COMPONENT 18	Land Use; Whose Responsibility? (6)

BEST COPY AVAILABLE

COMPONENT 17
ACTIVITY SHEET

YOU'VE GOT ME COVERED

LEARNER OBJECTIVE:

Students will be able to list what can be found in each land use category.

List what you could find in each land use category. Remember to include: plants, animals, birds, buildings.

AGRICULTURAL LAND

cropland	grassland	wetlands	forestland

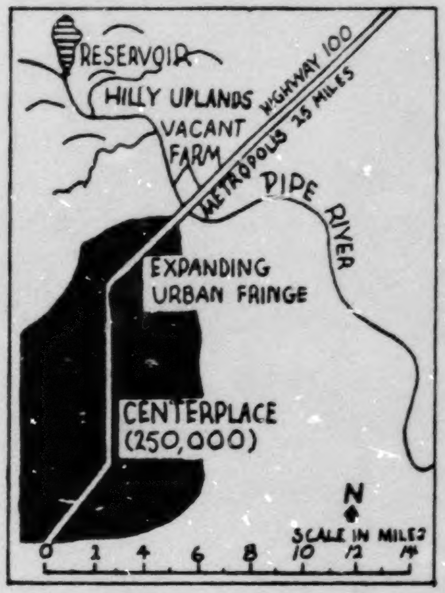
DEVELOPMENT

commercial	industrial	residential	public

CENTERPLACE CITY LAND USE PROBLEM

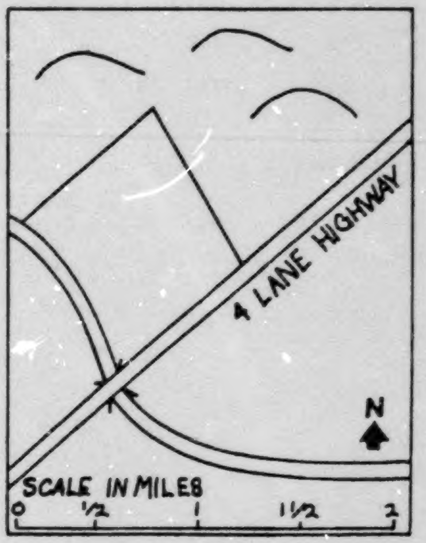
CASE STUDY

160 acres of unused county farmland, four miles northeast of the city is expected to be sold soon. Some of the interested buyers have indicated their desire to use the land for a purpose other than agriculture. The land is presently zoned for agricultural use. The current price for prime farmland is $2,000.00 an acre.


RESERVOIR
HILLY UPLANDS
VACANT FARM
HIGHWAY 100
METROPOLIS 15 MILES
PIPE RIVER
EXPANDING URBAN FRINGE
CENTERPLACE (250,000)
N
SCALE IN MILES
0
2
4
6
8
10
12
14

Background Information Sheet: Centerplace City

The population is 250,000 and rapidly increasing.
The city's boundaries are being extended, but the suburban fringe is expanding even more rapidly.
The rapid population growth is accompanied by demands for more housing, more jobs, additional city services, and recreational areas.
The power for industrial uses, adequate public transportation, and a skilled labor force are available.
The city is located near forests, which are to the north.
The land to the east is devoted mainly to farming.
The Pipe River is unpolluted and is the source of irrigation water as well as the municipal water supply.
The river is too small for freight transportation, but logs could be floated on it. The gravel bed of the river is appropriate new material for concrete manufacture.
The present sewage treatment plant and garbage disposal area are at maximum capacity.
The citizens of Centerplace are concerned about the maintenance of a scenic regional environment.
The Board of County Commissioners is the authority for land zoning, and many citizens' groups are developing to influence zoning decisions.


4 LANE HIGHWAY
N
SCALE IN MILES
0
1/2
1
1 1/2
2

List possible uses of the land below:

________________________ ________________________

________________________ ________________________

________________________ ________________________

SOURCE: Investigating Your Environment Series-U.S. Dept. Of Agriculture-Forest Series

BEST COPY AVAILABLE

PLANNING COMMISSION

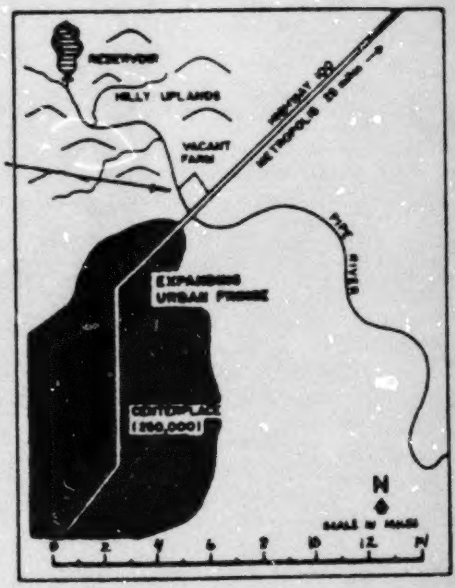
COMPONENT 18
ACTIVITY SHEET B

CASE STUDY

160 acres of unused county farmland four miles northeast of the city is now available for the city's use. The land is presently zoned for agricultural use. The current price for prime farmland is $2,00.00 an acre.

Background Information Sheet:
Centerplace City

The population is 250,000 and rapidly increasing.
The city's boundaries are being extended, but the suburban fringe is expanding even more rapidly.
The rapid population growth is accompanied by demands for more housing, more jobs, additional city services, and recreational areas.
The power for industrial uses, adequate public transportation, and a skilled labor force are available.
The city is located near forests, which are to the north.
The land to the east is devoted mainly to farming.
The Pipe River is unpolluted and is the source of irrigation water as well as the municipal water supply.
The river is too small for freight transportation, but logs could be floated on it.
The gravel bed of the river is appropriate raw material for concrete manufacture.
The present sewage treatment plant and garbage disposal area are at maximum capacity.
The citizens of Centerplace are concerned about the maintenance of a scenic regional environment.
The Board of County Commissioners is the authority for land zoning, and many citizens' groups are developing to influence zoning decisions.



Group making presentation (use category)	Criteria to assess presentation					
	1	2	3	4	5	6
			rating			

2. Elect a chairperson to preside during the group presentations and to run the meeting in an orderly manner. (5 minutes)

Announcement to be made by chairperson:

- Because of time constraints there will be no rebuttal after presentations.
- The Board may ask 2-3 clarifying questions of each group after all the presentations.
- You have 3 minutes to give your presentation. You will be given a warning when you have 1 minute left, by our time.

SOURCE: Investigating your Environment Series-U.S. Dept. of Agriculture-Forest Service

COMPONENT 18
ACTIVITY SHEET C

PRESENTATION PREPARATION

LEARNER OBJECTIVE:

Students will be able to discover the need for trade-offs in using land and identify the need for zoning procedures to protect agricultural land.

ASSIGNED CATEGORY OF LAND USE ______________________

Advantages to land and community	Disadvantages to land and community

Now, as a group, develop a 3 minute presentation to the Planning Commission. Include:

1. Reasons for wanting the land
2. How it would benefit the community
3. What price you would pay.

Consider such things as proper use of land, sewage, water, electricity, health, safety, taxes, economics, community needs, roads, etc., as you prepare your presentation.

*More than one person in each group must participate in making the presentation.

SECTION 6

SOIL CONSERVATION AND PRESERVATION

ACTIVITIES

- Use of Windbreaks, Contouring, Conservation Tillage, Strip Cropping, Grassy Swales
- Everything In Its Place Trees, Soil, Water, Grassland

AGRICULTURAL LAND
Is Disappearing
FAST
In
Minnesota

Governor's Council on Rural Development GCRD

SECTION 6

TEACHING PACKET

SOIL CONSERVATION AND PRESERVATION

COMPONENT 19	Soil Must Be Protected (4-6)
COMPONENT 20	Everything In Its Place (4-6)

SOIL MUST BE PROTECTED

AGE: Grade 4-6
SUBJECT: Science, Social Studies
SKILLS: Analysis application, comparison and contrast, observation, discussion, evaluation, generalization, inference, visualization
DURATION: 20-30 minutes
GROUP SIZE: Any
KEY VOCABULARY: Contouring, cultivated land, crop rotation, furrows, grass waterway, strip cropping, water erosion, windbreak. See Illustrated Vocabulary.

Description

Students will observe how strip cropping and contouring help to prevent water erosion.

Learner Objective

Students will be able to evaluate how contouring and strip cropping save soil from water erosion.

Background

See Curriculum Framework VI, pages 6 and 7.

Contour farming is one of the easiest and most widely accepted conservation practices. It is the use of implements across the slope of the land; that is on the contour. Contouring alone will not stop erosion. But it reduces soil erosion as much as 50 percent on a wide range of soil and slope conditions. Steepness and length of slope are important, as well as the crop grown and the condition of the soil.

Material

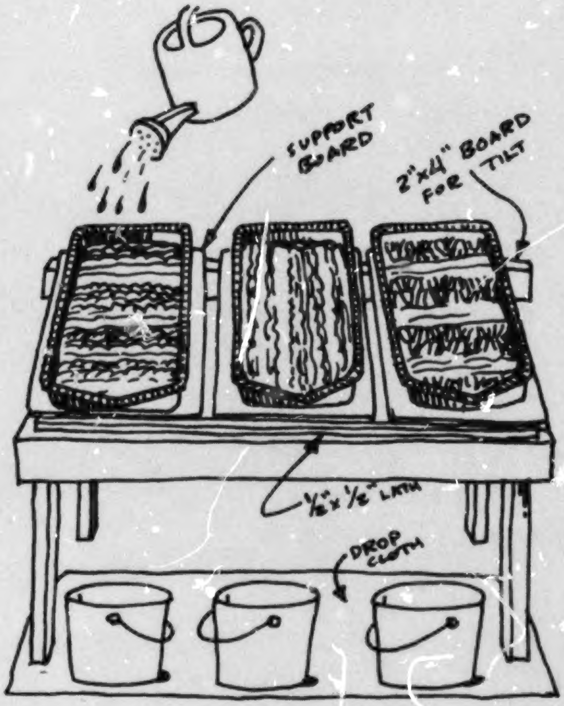
- 3 aluminum turkey roasting pans; a pan of soil with rows going up and down, a pan of soil with rows going across, and a pan with strips of grass and bare fields.
- Toy quart sprinkling can
- 3 plastic pails to catch run-off
- Large garbage bag cut apart under the plastic pails
- Colored markers
- Drawing paper

Be sure to have a board under each pan for support. On the front side of the support board, have a wooden strip to prevent the pans from sliding when tilted. Under the opposite end of the support board, place a 2" by 4" to tilt the pans.

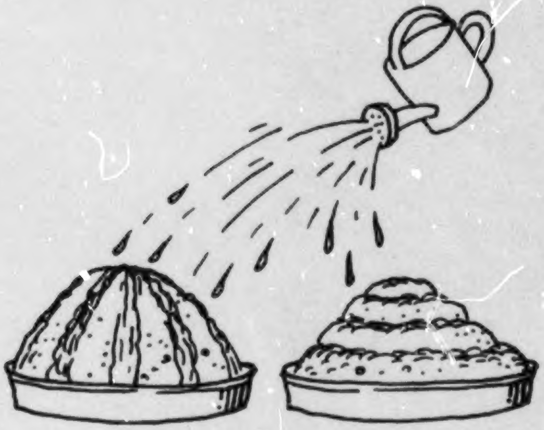
Form a spout in the pans by squeezing the edges. Set pans of soil on a table so the spouts extend over the edge. Place some two by fours under the other end to given them slope. Put a plastic bag on the floor under the pails that will catch the run-off.

Activity

1. With a pencil or your fingers make rows or furrows going ACROSS in one pan of soil. Make rows or furrows going UP and DOWN in the second pan of soil. The third pan will have alternating horizontal sections of sod and bare soil.



An option for demonstration would be mounds in cake pans.



Mounds in cake pans probably have much steeper slopes than most cultivated land.

2. Fill sprinkler with water. Sprinkle each pan at the same rate, at the same height (about a foot will be satisfactory) and with the same amount of water.
3. Which field absorbed the most rain? the least? Why was there a difference between how the fields absorbed the rain? Be specific in your answers.
4. How do contouring and strip cropping prevent erosion?
5. Have your students suggest all the different methods that can be used to prevent erosion. Make a list on the board. (contouring, windbreaks, conservation tillage, strip cropping, grassy swales, terracing)
6. Ask your students to choose one method of preventing erosion and draw a detailed picture of farmland using that method.

Evaluation

Given a list of ways to prevent erosion, students will draw a detailed picture depicting one method for preventing either wind or water erosion.

Recommended Reference Material

1. "Minnesota's Ag-Stravaganza" video-cassette, available from your Regional Soil and Water Conservation Office. See RESOURCE GUIDE, page 48.
2. Ding Darling Computer Discs. To order, see RESOURCE GUIDE, page 59.

Extended Activity

1. Tell, in picture form or in a paragraph, how windbreaks help to prevent wind erosion.

EVERYTHING IN ITS PLACE

AGE: Grades 5-6
SUBJECT: Social Studies, Science
SKILLS: Analysis, application, comparison and contrast, description, discussion, drawing, evaluation, generalization, inference, observation, synthesis, visualization
DURATION: Several class periods
GROUP SIZE: Any
SETTING: Indoor (or outdoor tour for observation)
KEY VOCABULARY: alfalfa, bayous, bogs, clay soil, commercial use, cropland, crop rotation, diversified farm, drainage areas, fertilizer, forestland, grassland, industrial use, loam soil, manure, marginal farmland, nutrient, one-crop farm, pastureland, potholes, prime farmland, public use, residential use, reservoir, sandy soil, sediments, slough, water erosion, wetlands, wind erosion. See Illustrated Vocabulary.
LEARNING PACKET: Extended Activity Sheet

Description

After viewing a film dealing with the importance of the balance in nature, students will draw a mural to show that balance.

Learner Objective

Students will be able to recognize the importance of the balance of forestland, grassland, wetlands, and cropland.

Background

See Curriculum Framework V, pages 4, 5, and 6 and Curriculum Framework VI, pages 6 and 7. Prime cropland is a precious natural resource. The soil is rich in nutrients. It is well drained, and soil erosion is light. Prime farmland produces high crop yields, requires less fertilizer, fuel, and labor than other land. About two-thirds of Minnesota's cropland is prime farmland.

Wetlands are swamps, marshes, bayous, bogs, potholes sloughs and ponds. They are nature's sponges which absorb excessive moisture, to prevent flooding. They are nature's reservoir where plants and water animals live and reproduce. They improve water quality by trapping nutrients and sediments that would otherwise enter lakes and streams.

Forested areas provide wood for construction, fuel, and habitat for wildlife. Forests also help to reduce run-off by protecting areas from flood and erosion.

Grassland is important as a source of food for livestock, wildlife habitat, and as protection from wind and water erosion.

Materials

- Film: "Everything In Its Place," 16mm, color; 33 minutes; free. See RESOURCE GUIDE, page 65.

Activity

1. Show the film "Everything In Its Place."
2. Draw a class mural showing some of the plants and animals found in the four categories of agricultural land: wetlands, grassland, cropland, and forestland.
3. Discuss the importance of wetlands, grassland, cropland, and forestland.

Recommended Reference Material

"Minnesota's Ag-Stravaganza" videocassette, available from the Regional Soil and Water Conservation Office. See RESOURCE GUIDE, page 48.

Evaluation

Given information from a filmstrip, students will depict the balance of forestland, grassland, wetlands, and cropland in a mural.

Extended Activities

1. Divide the class into two groups to work at a mural showing the difference between a diversified farm and a one-crop farm.

   Ask your high school Agriculture Instructor for some examples of the major plans of diversified farms in Minnesota. See RESOURCE GUIDE, page 31.

Mural:

Farm 1 - Diversified Farm. Draw fields of various crops, such as oats, alfalfa, soybeans. Draw farm building and farmyard with at least one animal, such as milk cows, beef cattle, hogs, or sheep.

Farm 2 - One Crop Farm. Draw fields of almost one crop. Examples: almost all corn, with a little soybeans. Draw farm buildings and farmyard with no animals.

Discussion Questions

A. How much crop rotation is possible on Farm 1? on Farm 2? Which farm is a better example of protecting the soil? Why?

B. Where are there more likely to be trees? How does this help the soil?

C. Which farm would be more likely to have crops that would return nutrients to the soil? Why is this important?

D. How do animals help to provide better soil? (Manure provides natural fertilizer.)

E. How do farms that have no animal manure return nutrients to the soil? (Chemical fertilizer...increases costs for farmer.) Find out why manure, which contains organic matter, can build up soil better than chemical fertilizer alone can.

F. Which farm will more likely have better and deeper topsoil to pass on to you, the next generation?

Using Component 20 Extended Activity Sheet, have your students review the advantages and disadvantages of diversified farming and one-crop farming.

2. Contact your county Soil and Water Conservation office to arrange a tour of a neighboring countryside which has examples of these four uses of agricultural land - cropland, grassland, forestland, and wetlands. Ask the resource person to explain the need and benefit of each type. Also observe areas that have been developed for residential, commerical, industrial and public use.

   What kind of agricultural land has been converted to these uses? What happens to the natural flow of water in these areas? Why would floods result from inappropriate development in poor drainage areas?

   If too much land is developed, where will farmers seek more farmland? (They cut down trees or drain wetlands.) These areas often become marginal farmland, less fertile and easily subject to wind and water erosion.

   Consider where it would be most appropraite to build homes, shops, factories, schools, parks, and hospitals. Consider the food growing capacity of areas that are being developed.

3. In one corner of the classroom make a conservation corner. This "corner" can be a place to exhibit many things that relate to the wise use of soil, water, grassland, woodland, wildlife, and mineral resources.

   You will need a long table. Here are some things that you can collect and keep on the table:

   a. Different kinds of soil - loam soil, clay soil, sandy soil. Put them in small glass jars and label them.
   b. Different kinds of rocks from which soil is made - limestone, sandstone, shale, marble, granite, and as many others as you can find. Label each.
   c. Seeds of various crops that have soil conservation uses such as grasses, clovers, alfalfa. Label each.
   d. Leaves, bark, twigs, and fruit of trees, shrubs, and vines that grow in your locality. Learn how to collect leaves and to press and mount them for display.

   To make live things more alive and dead things "live," make your displays and collections tell a story. Collecting leaves, insects, and rocks is much more interesting if the leaves are organized into smaller, more significant displays of leaf types, and if the rock exhibits show how mountains are formed, what kind of soil they make, and what stones are used for building materials.

   A label on an object or exhibit can capture interest, create curiosity, or make the reader think. The labels should be short, informal, and chatty. Make new labels occasionally to point out new facts of interest.

   There may not be room for all the displays to be shown at once. But changing the scene is good and can be more interesting anyway.

SECTION 6

LEARNING PACKET

SOIL CONSERVATION AND PRESERVATION

COMPONENT 19	Soil Must Be Protected (4-6)
COMPONENT 20	Everything In Its Place (4-6)

COMPONENT 20
EXTENDED ACTIVITY SHEET

EVERYTHING IN ITS PLACE

LEARNER OBJECTIVE:
Students will be able to recognize the importance of the balance of forestland, grassland, wetlands, and cropland.

DIVERSIFIED FARM	ONE CROP FARM
advantages	advantages
disadvantages	disadvantages

SECTION 7

LAND UTILIZATION; WORLD FOOD NEEDS

ACTIVITIES

- Brainstorming
- Hunger Simulation
- Graphs . . . Food Needs

Our World Needs Food — Soil Produces That Food.
Each Year We Have

LESS SOIL — MORE PEOPLE

Wake Up and Save Our Soil
From Unplanned Use of Agricultural Land
For Non-Agricultural Purposes
From Water and Wind Erosion

Governor's Council on Rural Development GCRD

SECTION 7

TEACHING PACKET

LAND UTILIZATION: WORLD FOOD NEEDS

COMPONENT 21 Why Are People Hungry? (6)
COMPONENT 22 Who's Hungry in the USA? (6)

WHY ARE PEOPLE HUNGRY?

LESSON ONE
AGE: Grade 6
SUBJECT: Social Studies, Geography
SKILLS: Comparison and contrast, discussion, expressive writing
DURATION: 30-40 minutes
GROUP SIZE: Any
SETTING: Indoors
LEARNING PACKET: Activity Sheet A

LESSON TWO
AGE: Grade 6
SUBJECT: Social Studies, Health
SKILLS: Brainstorming, discussion, evaluation, expressive writing
DURATION: 20 minutes
GROUP SIZE: Any
SETTING: Indoors
LEARNING PACKET: Activity Sheet B

LESSON THREE
AGE: Grade 6
SUBJECT: Health, Geography, Mathematics
SKILLS: Analysis, comparison and contrast, evaluation, expressive writing, graphing
DURATION: 40 minutes
GROUP SIZE: Any
KEY VOCABULARY: Infant mortality, population density. See Illustrated Vocabulary.
LEARNING PACKET: Activity Sheets C and D
SOURCE: Food First Curriculum, Institute for Food and Development Policy, 1984

INTRODUCTION

One cause of hunger is that people don't have access to the land they need to grow food. A priviledged minority has economic control over the land, jobs, and other resources that people need to feed themselves.

The extent and importance of this component requires that it be taught in three separate lessons. Each lesson can be taught independently of the others, but for a more complete understanding of the concepts, all lessons should be taught.

Lesson One

Description

The group will be divided up into sections simulating world population divisions and served a snack food divided into portions proportionate to the control of world resources.

Learner Objective

Students will be able to demonstrate that scarcity is not the cause of hunger, but the inequality of the distribution of resources.

Background

See Curriculum Framework VII, pages 7 and 8.

"Most of us were brought up believing that there wasn't enough food to go around. We were told 'be grateful and clean up your plate,' and learned that food was scarce.

Actually, the world has never produced so much food--more than enough to feed every child, woman, and man as many calories as the average American eats.

Yet hunger is on the rise.

More than one billion people in the world go without enough to eat.

Every minute, 27 people--most of them children--die from hunger or hunger-related diseases. That's more than 14 million a year.

In some U.S. cities, infant mortality rate, a telling measure of undernourishment, is as high as in many underdeveloped countries...and rising.

Imported foods--coffee, bananas, pineapple, winter tomatoes--fill our supermarkets, while Third World people who grow these foods have even less to eat than before. U.S. farmers produce record harvests, yet farm bankruptcy rates today approach those of the Great Depression. Because of monopoly control in the food industry, U.S. consumers are overcharged $20 billion each year. And 6 of the 10 leading causes of death in this country can be traced to changes in the American diet linked to the food industry's quest for higher profits."

SOURCE: "Finishing Your Dinner Tonight Won't Help The Hungry," FOOD FIRST, Institute for Food and Development Policy, 1984. For more information see: WORLD HUNGER, Four Myths, included in Component 21 Teaching Packet.

Materials

- World map
- Enough of a nutritious snack food to provide every person with a generous snack portion. Example: graham crackers, fruit slices, peanuts, popcorn, raisins.
- Component 21 Activity Sheet A, "Curriculum Pretest" from Learning Packet

Activity

To introduce the concepts of this section, distribute Component 21 Activity Sheet A, "Curriculum Pretest." Have the students complete the test. Ask students to correct their own as you read the answers. Discuss the results of the test and which answers surprised the students.

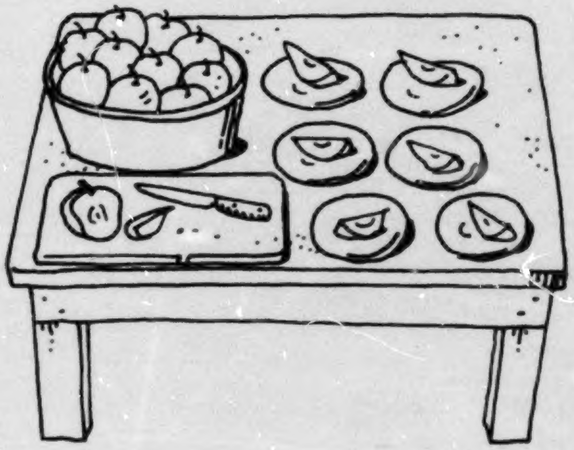
ANSWER KEY to "Curriculum Pretest" 1) yes; 2) 1 out of 4; 3) yes; 4) all over the U.S. or around the world; 5) fewer farmers today; 6) 75%; 7) Native Americans, women, people over 70 years old, people 1 to 15 years old; 8) fewer people deciding; 9) yes; 10) ordinary people.

NOTE: This activity requires special sensitivity on the part of the teacher.

1. In advance, obtain the snack food and divide it up in the appropriate portions simulating world resource distribution. Start with a more than generous portion for each child. Plan to divide the food so that roughly one quarter will receive a very small portion, roughly one quarter will receive a moderate portion, and roughly one quarter will receive a very large portion.

   Within the last group you may want to subdivide so that one or two children have even larger portions than the others.

   Example: For a group of 24, start with 24 medium-to-large sized apples cut into quarters, for a total of 96 slices.



- 6 persons (25%) will receive nothing or crumbs
- 6 persons (25%) will receive one slice each
- 6 persons (25%) will receive three slices each
- 5 persons (22%) will receive ten slices each
- 1 person (3%) will receive 25 slices

2. Explain to the group that you are going to serve a simulation snack that reflects how much people around the world get to eat. Ask for discussion on the children's ideas on the distribution of food in the world - how many people go hungry and where they live. Do not let individuals or groups of individuals pretend they represent a particular country. It is important to stress that, while the distribution of the snack represents global food distribution, there are hungry people and well-fed people in virtually every country.

3. Ask the participants not to eat until told to do so. Distribute the snack randomly so that children receiving large portions are close to children receiving small portions and to those receiving nothing.

4. Explain how the distribution corresponds to that in the real world. In some countries, such as the U.S., there are a few very rich persons, many middle-income persons, and a smaller number of poor persons who often go hungry. In some countries, such as Sweden, almost everyone has a middle-income level and no one goes hungry. In some countries, such as India, most of the people are poor and often hungry, but there are a few rich persons and a few middle-income persons. In some countries, such as the People's Republic of China, almost all of the people have low to middle incomes, but no one goes hungry.

Allow the children to react to the situation. Let the group try to work out whether they would like to distribute the food more fairly or to eat it as is. If they choose to change the distribution, let them try to design a fair method in their own way. This should be an extremely difficult task. The purpose of this is to give students a feel for how hard it is for people of the world to negotiate fair solutions to problems.

Note: If your group has had a lot of experience working together and cooperating, you may choose to not allow discussions on redistribution of the snack. If this step is done quickly and easily, it would negate the realism of this simulation of the inequalities in the world.

5. Allow the children to eat. Explain the fact that the world produces enough to feed every child, woman, and man the equivalent in calories to what the average person in the U.S. eats every day. Discuss the process-how it relates to the real world and relationships among countries, how the children with the biggest portions feel, how the children with the smallest portions feel, how the real world might be able to equalize the availability of food compares to the children's previous ideas discussed in Step 2.
6. Make it clear to the children that the inequalities in food distribution exist here in the United States and Canada as well as in other parts of the world. Discuss the existence of hunger in your area, the children's experiences with hungry people, the possible causes of hunger, and possible solutions.
7. Journals--Allow the children to make journal entries on how it felt to be a part of the simulation, and about the existence of hunger in a world of plenty.

Evaluation

Given a simulation snack that reflects how much people around the world get to eat, students will react to the protions they receive and attempt to design a fair method for distribution.

Recommended Reference Material

Food First Comics for students, deals with exploding myths of scarcity. See RESOURCE GUIDE, page 68.

WHY ARE PEOPLE HUNGRY?

Description

The group will do a brainstorming exercise on the causes of hunger.

Learner Objective

Students will be able to demonstrate the concept of a root cause of a situation.

Background

See Curriculum Framework VII, pages 7 and 8.

Brainstorming is a process of group idea gathering that stimulates creative thinking. Group members take turns throwing out any and all thoughts that come to mind on a subject while one person records all the ideas. There are no right or wrong answers at this stage. Ideas that may seem to be ridiculous often are the ones that stimulate the best ideas in the end. No one is allowed to criticize any of the ideas. This encourages a free flow of ideas that often leads to a better final product than any other method of idea gathering.

Materials

- Butcher paper
- Marking pen
- Component 21 Activity Sheet B, "Why are People Hungry?" from Learning Packet

Activity

1. Explain to the group that you will be using the process of brainstorming to come up with a list of possible causes of world hunger.
2. When everyone has run out of ideas, the group looks over the list and discusses the possibilities, trying to choose the best, most correct, or most practical idea.
3. Ask someone to be the recorder. Every idea should be recorded on the butcher paper. Chosse a process that gives all persons a chance to present their ideas but prevents two or more persons from speaking at one time. Begin the brainstorming by asking for the group's ideas on the causes of world hunger. Explain that the goals are to show what the prior conceptions about hunger are and to stimulate thinking about world hunger.
4. When all the ideas have been thrown out, ask the group to think about why the ideas listed exist. Explain the meaning of a root cause of a situation. A root cause is an underlying factor that lies at the foundation of a problem.

Examples:

Problem - A boy has trouble doing math problems in school. Cause - Tiredness, sleepiness. Root cause - The boy's parents often have loud parties that last until late at night, preventing the boy from getting a good night's sleep.

Problem - A girl cannot answer questions about a story the class was given to read. Cause - She cannot read well enough to understand the story. Root cause - The girl has a slight disorder that has not been detected which prevents her from seeing the words and letters clearly.

Have the students copy the list of causes onto one column of Component 21 Activity Sheet B. On a second column they should list root causes.

5. Discuss. See if there is any consensus on which of the ideas listed might be the most important in causing hunger. Note: Save the results of this brainstorming session for discussion after completing Component 22.
6. Journals - Allow time for children to make journal entries about brainstorming, root causes, and the causes of world hunger.

Evaluation

Given a list of causes in one column, students will list the possible root causes of each situation in the opposite column.

WHY ARE PEOPLE HUNGRY?

Description

The children will read charts and prepare their own graphs comparing hunger and population density.

Learner Objective

The students will be able to demonstrate knowledge that "over population" does not cause hunger through learning that density and hunger are not correlated.

Background

See Curriculum Framework VII, pages 7 and 8.

Infant Mortality is a statistic that is frequently used to indicate how much hunger exists in an area. Infant mortality represents the annual number of deaths per 1,000 live births of infants under one year of age. Malnourished and hungry infants and those born to malnourished and hungry mothers are much more likely to die that are well fed babies. Diseases are more likely to strike undernourished babies, and once afflicted with a disease, undernourished babies are more likely to die. Thus hunger is a major underlying cause of infant mortality.

The population density figures shown in this activity refer to the number of people per hectare of permanently cropped and arable land. One hectare = 2.5 acres.

This is approximately the size of a football field. Permanently cropped land has crops which occupy the land for long periods and do not need to be replanted every year. Arable land includes land that is used for temporary crops, temporary meadows, market and kitchen gardens, and temporarily idle land.

Materials

- World map
- Colored pens or pencils
- Pencils
- Copies for everyone of Component 21 Activity Sheets C and D from Learning Packet Component 21

Activity

1. To prepare, display a world map and distribute Component 21 Activity Sheets C and D, "What do the Numbers Mean," "Worksheet Questions."

   Explain that the class will be doing an exercise on population and hunger. Discuss whether any children think that hunger is caused by too many people. Explain that this is a very common belief in the U.S. and that you will be working through an exercise to show whether this is true or false.
2. Discuss the meaning of infant mortality.

   Make sure that everybody understands that a high infant mortality rate means there is lots of hunger. A low infant mortality rate means hunger is not widespread. Rates of 25 or below can be considered low. Rates of 75 or above can be considered high. Rates of 26 to 74 an be considered moderate. Hunger is commonly found in areas where the infant mortality rate is above the low range of 0 to 25.
3. Discuss the concept of population density.

   Make sure that everybody understands population density. Some countries have many people and a small amount of farmland (example: the Netherlands). Some countries have very few people and much farmland (example: Australia). A population density of 2 or below can be considered low. A density of 7 or above can be considered high. Densities of 3 to 6 can be considered moderate.

4. Distribute the graph worksheets and writing materials as needed. Go over the information about the countries that are already plotted on the graph. Show the children how to plot the information from the chart onto the graph on the worksheet. Each country's point could be plotted in a different color. Underneath the graph the name of the country should be written out and the color used for it should be shown. Show what the graph would look like if population and hunger were positively correlated. A sample graph is shown at the bottom of Activity D, "Worksheet Questions."

   There are several ways to have a group work through this exercise: as a group, in teams of two to four children, or as individuals.

5. When the graphs are completed, bring the group back together. Discuss the graphs, the countries where many people go hungry, the countries where population is dense, and whether hunger and population density are related.

6. Optional - Discuss the differences between correlation and causation. Correlation means that the incidence of two factors is related in some way. If one of the factors causes the other one, the two will be positively correlated. If the two things are correlated, however, one does not necessarily cause the other.

   You may want to come up with a list of pairs of factors. Write them on the board and have the children decide whether each pair is correlated and, if so, whether one could cause the other. You may want to have the children write their own examples.

   Examples

   - Freckles are found most often in people aged 5 to 12. Measles occur most often in people aged 5 to 12. Freckles and measles are correlated. Freckles do not cause measles. Measles do not cause freckles.
   - It snows more in Maine in the winter than in Florida. It is colder in Maine in the winter than in Florida. Snow and cold are correlated. Cold is one of the factors causing snow.
   - The density of population varies a lot from country to country. There are hungry people in some countries but not in others. Population density and hunger are not correlated. Population density does not necessarily cause hunger. Hunger does not necessarily cause population density.

7. Journals - Allow time for the children to put their charts and graphs into their journals and make entries about population and hunger.

Evaluation

Given data, students will graph the Infant Mortality Rate and Population Density for eight countries.

POPULATION DENSITY AND INFANT MORTALITY IN SELECTED COUNTRIES*

CONTINENT AND COUNTRY	POPULATION** DENSITY	RANKING	INFANT*** MORTALITY	RANKING
North America				
Canada	less than 1	low	12	low
U.S.A.	1	low	13	low
Central America				
Mexico	4	moderate	70	moderate
Guatemala	4	moderate	76	high
Cuba	3	moderate	25	low
Puerto Rico	21	high	20	low
El Salvador	7	high	51	moderate
Haiti	6	high	130	high
South America				
Brazil	3	moderate	64	moderate
Argentina	1	low	66	moderate
Chile	2	low	40	moderate
Europe				
Sweden	3	moderate	8	low
United Kingdom	8	high	14	low
Poland	2	low	22	low
Netherlands	16	high	10	low
France	3	moderate	11	low
West Germany	8	high	15	low
East Germany	3	moderate	13	low
Asia				
Israel	9	high	15	low
Bangladesh	9	high	153	high
Peoples Rep. China	9	high	56	moderate
Japan	23	high	8	low
India	4	moderate	134	high
Saudi Arabia	7	moderate	150	high
Afghanistan	3	moderate	226	high
Sri Lanka	7	high	42	moderate
Phillipines	6	moderate	80	high
Eurasia				
U.S.S.R.	1	low	31	moderate
Africa				
Egypt	14	high	90	moderate
Nigeria	3	moderate	157	high
Ethiopia	2	low	162	high
Zimbabwe	3	moderate	129	high
Sudan	2	low	141	high
Guinea-Bissau	2	low	208	high
Somalia	3	moderate	177	high
Zaire	4	moderate	160	high
South Africa	2	low	97	moderate
Australia				
Australia	less than 1	low	12	low

* Figures for this chart were taken from the 1979 FAO Production Yearbook of the United Nations Food and Agriculture Organization and from the "1980 World Population Data Sheet" of the Population Reference Bureau (Washington, D.C.).

** Number of people per hectare of permanently cropped and arable land.

*** Annual number of deaths per 1,000 live births to infants under the age of one year.

WORLD HUNGER

Four Myths

MYTH 1

People are Hungry Because of Scarcity - Both of Food and Land

Enough grain is produced in the world to provide everyone with ample protein and 3000 calories a day, about the caloric intake of the average American.

But global estimates mean little, except to dispel the widespread notion that we have reached the earth's limits. What counts is whether adequate food-producing resources exist where people are most hungry.

They do exist, but these resources are invariably under-utilized or misused to meet the demands of those already adequately fed.

One way to measure untapped potential is to look at the gap between current production and possible production. Only about 44 percent of the world's cultivable land is now being cropped. Average grain yields in the underdeveloped countries are less than one-half of the yield in industrial countries. Much land, presently harvested only once yearly, could provide two or even more harvests. In most cases, the barriers to greater production are not physical, rather, they are social. Undemocratic control of productive resources thwarts their development.

In most countries where people are hungry, large landholders control most of the land. A study of 83 countries showed that slightly more than 3 percent of all landholders, those with 114 acres or more, control almost 80 percent of all farmland. But these large landholders are the least productive. In a cross section of countries studied, they consistently harvest lower yields per acre than the smallest farmers, as we detail later. Moreover, many large handholders who hold land as an investment, not as the source of their food, leave considerable amounts unplanted.

In addition, the low productivity in the Third World reflects the fact that poor farmers, too, are not nearly as productive as they could be. Access to nonusurious credit, extension services and markets are monopolized by the larger, more influential landholders.

In Bangladesh, the average rice yield is only one-half of the world average. Yet Bangladesh does not lack what it takes to grow rice. It has rich alluvial soils, plenty of sun, and abundant water that could easily be controlled for irrgiation. Rice yields six times greater have been proven possible on experimental plots in Bangladesh.

The problem in Bangladesh, as in so many countries, is that economic and political structures block development. About 90 percent of all the land in Bangladesh is worked in all or in part by tenants and laborers, not by those who own the land. This fact, in part, explains low productivity. Why would tenants or laborers be motivated to conserve and improve drainage and irrigation when such investments would primarily benefit the landowners? Moreover, developing Bangladesh's vast water resources requires cooperative work. But cooperation is impossible when 11 percent of the households have taken control of 43 percent of the land. The rest of the rural people, including nearly half the rural households who are functionally landless, are forced to compete against each other for sheer survival.

In countries where people are hungry, not only is land underutilized, it is misutilized. Where the majority have too little money to make their needs felt in the marketplace, food-producing resources serve those who can pay - the upper domestic strata and higher paying markers abroad. Luxury crops expand, therefore, while basic food crops are neglected. In Central America and the Caribbean, where as many as 70 percent of the children are undernourished, approximately half of the agricultural land, invariably the best land, is made to produce crops and cattle for export instead of basic food for local people.

The pattern of food-producing resources diverted to the already well-fed continues even in the face of famine. Agricultural exports from the Sahelian countries dramatically increased during the early seventies, in spite of worsening drought and widespread hunger. Cattle exports during 1971, the first year of drought, totaled over 200 million pounds of vegetables were exported, largely to Europe. During the drought years 1970-1974, the value of the region's agricultural exports reached a record $1.5 billion.

Scarcity, then, is not the cause of hunger. The illusion of scarcity is a product of extreme inequalities in control over food-producing resources that thwart their development and distort their utilization.

MYTH 2
Hunger Will Be Overcome By Concentrating On Producing More Food

The narrow production approach has been the central thrust of the "War on Hunger" for at least 30 years. Governments, international agencies, and multinational corporations have promoted "modernization" - large-scale irrigation, chemical fertilizers, pesticides, machinery and the seeds dependent on such inputs - all to make the land produce more.

But when a new agricultural technology enters a system based on power inequalities, it profits only those who already possess some combination of land, money, credit "worthiness" and political influence. This selectivity alone has excluded most of the world's rural population and all the world's hungry.

Once agriculture is turned into a speculative investment in which sheer control over the basic physical resources promises financial success, a catastrophic chain of events is set into motion. A new class of "farmer" - moneylenders, military officers, bureaucrats, city-based speculators, and foreign corporations - buy up agricultural land. Competition for land sends land values soaring. For instance, land values have jumped three to five times in the "Green Revolution" areas of India. Higher rents force tenants and sharecroppers into the ranks of the landless, who now make up the majority of the rural population in many countries. With their increased profits, the powerful buy out small landholders gone bankrupt. Fewer and fewer people gain control over more and more food-producing resources. In Sonora, Mexico, before the "Green Revolution," the average farm size was 400 acres. After 20 years of publicly funded modernization, the average around the "Green Revolution" hub city of Hermosillo has climbed to 2000 acres, with some holdings running as large as 25,000. In contrast, over three-quarters of Sonora's rural labor force have no land at all.

Moreover, with vast acreages planted uniformly in the most profitable crop, large commercial operators mechanize to avoid labor "management problems." Many made landless by the production focus, finding ever fewer agricultural jobs, join the hopeless search for work in urban areas.

Focusing on production totals has transformed rural development into a technical problem - one of getting the "right," usually foreign-made, inputs to the "progressive", invariably well-placed farmers. We refer to this production focus as narrow precisely because it ignores the social reality of hunger - that the hungry are those with control over little or no food-producing resources. "Agricultural modernization" is but a mirage of rural development - a mirage that undermines the interests of the majority of the rural population in order to serve those of a few - large landholders, moneylenders, industrialists, bureaucrats, and foreign investors.

The result of the technical production push without a prior redistribution of control over food resources leads to tragic yet predictable results; in many countries more food per person is being produced; yet more people are more hungry. Empirical studies recently prepared for the International Labor Organization document that in the very Asian countries - Pakistan, India, Bangladesh, Sri Lanka, Malaysia, the Phillipines and Indonesia - where the focus has merely been on increasing food production and where food production per capita has risen (with the exception of Bangladesh), the rural poor are absolutely worse off than before.

MYTH 3

An Underdeveloped Country's Best Hope For Development Is To Export Crops In Which It Has A "Natural Advantage." It Can Then Use The Earnings To Import Food And Industrial Goods.

Since grade school geography classes where we were taught to identify a country with a single crop-bananas with Honduras, coffee with Brazil, cocoa with Ghana - most of us have come to see an underdeveloped country's concentration on one or two export crops as "natural." In reality, there is nothing inevitable about the concentration on a few, largely low-nutrition crops. These crops were chosen by the colonial powers solely on the basis of what would bring the greatest profit in the high-paying markets back home. The same land now made to grow cocoa, coffee. rubber, tea, or sugar could grow an incredible diveristy of nutritious crops.

Nor is there any advantage to concentrating on one or two crops. Such reliance generates economic as well as political vulnerability. Extreme price fluctuations associated with tropical crops (often combined with slow-maturing plants - a coffee tree, for example, takes 5 years to mature) make development planning a nightmare.

Both the natural advantage (or "comparative" advantage) theory and a narrow focus on trade justice hide the reality that those who benefit from the foreign exchange earned by the agricultural exports are not the people whose labor produces the exported crops. Tea is a major export and foreign exchange earner for Sri Lanka, yet the maximum a tea worker earns is $14 a month. Bananas are the top agricultural export from the Phillipines, but earnings of banana workers amount to about one percent of the retail price of bananas in the Japanese market.

The very success of export agriculture can further undermine the position of most of the rural population. When commodity prices go up, tenants and self-provisioning farmers are threatened with loss of their land as the big landholders expand their holdings in order to profit on the higher commodity prices. Moreover, an increase in the world price of a commodity can trigger inflation which can result in less real income for the plantation worker or peasant producer. For instance, when in 1974 the world price of sugar increased several fold, the real wage of a cane cutter in the Dominican Republic actually fell to less than it was 10 years earlier; a nominal increase in a cane cutter's wage did not compensate for the inflation set off by the sugar boom.

Moreover, governments giving priority to agricultural exports are governments that relentlessly suppress movements for land redistribution and other democratic social reforms.

MYTH 4
Hunger Is A Contest Between The Rich World And The Poor World

Terms like "hungry world" and "poor world" make us think of uniformly hungry masses. They hide the reality of vertically stratified socities in which hunger afflicts the lower rungs in both underdeveloped countries and in the industrial countries, including the United States. Terms like these make hunger into a place - and usually a place over there. Rather than being a result of a social process, hunger becomes a static fact, a geographic given.

Moreover, the "rich world" versus "poor world" scenario makes the hungry appear as a threat to the material well-being of the majority in the industrially developed countries. To average Americans and Europeans, the hungry become the enemy who, in the words of Lyndon Johnson, "want what we got." In truth, however, hunger will never be addressed until average citizens in countries like the United States see that the hungry abroad are their allies, not their enemies.

How are the interests of the majority of Americans allied with those of the hungry majority in the underdeveloped countries?

The hungry in underdeveloped countries and ordinary Americans are liked through a common threat: the tightening of control over food - both within countries and on a global scale. The very process of increasing concentration of control over land and other productive resources that we have identified as the direct cause of hunger in underdeveloped countries is going on right here at home.

- Only 5.5 percent of all farms in the United States not operate over one-half of all land in farms. The resulting landlessness and joblessness in rural America are at the root of much of the persistent hunger in the midst of agricultural bounty.
- Almost 90 percent of vegetable production in the United States is controlled either directly by major processing corporations or indirectly through contracts. Many farmers already have no choice but to sign the processor's contract or to go out of business.
- Less than 0.2 percent of all food manufacturers in the United States control about 50 percent of all the industry's assets.

Many of these same oligopolistic corporations, aided by governments and international agencies, are now expanding their operations into underdeveloped countries. Del Monte now exports pineapples from Kenya and the Phillipines to the United States, Europe and Japan; the House of Bud, the European affiliate of the California lettuce grower, flies fresh produce from Africa to Europe; and United Brands jets cut flowers from Central America to the United States. These multinational agri-business firms are busily creating a Global Farm to serve a Global Supermarket. Finding production sites in underdeveloped countries, where land and labor can cost as little as 10 percent of those stateside, large food corporations are shifting production of high value items - vegetables, fruits, flowers and meat - out of countries like the United States.

In the Global Supermarket, the poorest in the Phillipines, Colombia and Senegal must reach for food on the same shelf as hundreds of millions of consumers around the world. Every item has a price, and that price is determined by what the Global Supermarket's better-off customers are willing to pay. The sad reality is that even Fido and Felix in countries like the United States can outbid the world's hungry. Consumers in the industrial countries unwittingly become a suction force, diverting food resources in the underdeveloped countries away from meeting local needs.

The Global Farm and Supermarket create the type of interdependence no one needs. "Interdependence" in a world of extreme power inequalities becomes a smokescreen for the usurpation of food resources by a few for a few.

(This essay is excerpted from the pamphlet "World Hunger: Ten Myths.")

WHO IS HUNGRY IN THE U.S.A.?

LESSON ONE
AGE: Grade 6
SUBJECT: Mathematics, Health, Reading
SKILLS: Application, analysis, comparison and contrast, computation, evaluation, expressive writing, problem solving
DURATION: 2 class periods
GROUP SIZE: 20-30 students
LEARNING PACKET: Activity Sheet A

LESSON TWO
AGE: Grade 6
SUBJECT: Reading, Health
SKILLS: Application, comprehension, discussion, expressive writing, vocabulary
DURATION: 20-30 minutes
GROUP SIZE: Any
SETTING: Indoors
LEARNING PACKET: Activity Sheet B

LESSON THREE
AGE: Grade 6
SUBJECT: Mathematics, Health, Social Studies
SKILLS: Analysis, chart reading, discussion, expressive writing
DURATION: 20-30 minutes
GROUP SIZE: Any
SETTING: Indoors
LEARNING PACKET: Activity Sheet C
SOURCE: Food First Curriculum, Institute for Food and Development Policy, 1984.

INTRODUCTION

In the U.S.A., where there seems to be a surplus of food, how can there be hunger?

One of the reasons farmers raise more and more crops is to maintain a balance between the cost of their farming operation and the income from their crops. The need to produce more and more crops can lead to practices which ravage the soil.

The extent and importance of this component requires that it be taught in three separate lessons. Each lesson can be taught independently of the others, but for a more complete understanding of the concepts, all three lessons should be taught.

LESSON ONE

Description

Students will participate in a simulation game or fill our a worksheet in which they budget their incomes, trying to pay rent, utilities, and food costs for their "families" for a month.

Learner Objective

Students will be able to simulate the experience of paying for housing, heat, and food on a poverty-level income.

See Curriculum Framework VII, pages 7 and 8.

People become poor due to circumstances beyond their control. No one wants to be poor. The poor are victims of racial discrimination, fixed incomes, poor health, cultural barriers, outdated or underdeveloped job skills, limited mobility, and personal psychological problems. It is a combination of these factors, not shiftlessness or laziness, that causes poverty.*

*"Minnesota Poverty - The Face of Poverty," Report 2, Minnesota Department of Economic Security, August 1983.

Materials

- Pencils
- Paper money in $5, $10, $20, and $100 denominations, enough for each player to start with the total shown in Step 1. (This money can come from any board game or you can make it yourself. A sample is enclosed.)
- Rent Receipt Cards - one for each player
- Utility Receipt Cards - one for each Player
- Weekly Food Tickets
  Weekly Gourmet Meal Tickets - four for each Player
  Weekly Moderate Meal Tickets - four for each Player
  Subsistence Meal Tickets - four for each Player
  (Tickets and Receipt cards can be made from any paper or cardboard. The "value" of each depends on the Player Description Category of each Player. See Step 1 to determine how many of each category of Tickets and Receipt Cards are necessary.)
- Budgeting Worksheet - one for each Player
- Player Description Sheets - one for each player. (There are four categories of Player Descriptions. See Step 1 when determining how many of each are necessary for your group.) Samples of all needed materials are shown at the end of this activity.
- Component 22 Activity Sheet A from Learning Packet "Budgeting Worksheet"

CHART OF NUMBER AND VALUE OF MATERIALS NEEDED TO PLAY MAKING ENDS MEET

Category	(Number of participants in group of 25)	Number of Dollars of Monthly Income per Player	Dollar Value Monthly Rent Receipt	Dollar Value Monthly Utility Receipt	Dollar Value Gourmet Weekly Meals*	Dollar Value Moderate Weekly Meals*	Dollar Value Subsistence Weekly Meals*
A	1	15,000	2,000	350	350	140	55
B	2	1,500	600	100	150	60	25
C	10	350	175	40	200	80	35
D	10	150	100	25	50	20	10

*Four per Player of each Meal Ticket.

Activity

Note: This activity can be used as an individual worksheet exercise instead of as a simulation. If you choose to eliminate the simulation game, you will need only one budgeting worksheet and one player description sheet for each player and no Rent Receipt cards, Utility Receipt cards, or Weekly Food Tickets. "Helpers" will not be needed.

1. In advance, prepare the materials for your class. You may want to have the children help you draw and cut the paper money, Weekly Meal Tickets, Rental Receipt Cards, and Utility Receipt Cards. First, plan the number of each item that you will need by determining how many children will be assigned to each game category.

   Three people will be needed as Helpers to play the roles of Landlord, Utility Company Representative, and Food Store Worker. You will probably want to be the Food Store Worker yourself or have another older person do this as this role is a little more complex that the others. (It is described in Step 2.) The rest of the group members will be Players.

   The Players should be divided into four categories. Each category represents one income level.

   Category A: Have one Player take the role of Stephen Stephenson, butler/housekeeper for Tom Trueblood, banking executive.

   Category B: Have one or two Players represent Sam Ohito, community college lecturer, husband, and father.

   Category C: Have one-half of the remainder of the Players represent Bertha Brown, fast food restaurant cashier, mother, and head of household.

   Category D: Have the rest of the Players represent Millie Millichsky, recent widow of a retired shopkeeper. (In a group of 25, two will be Helpers if the teacher is the third Helper, one will play Category A, two - Category B, ten - Category C, ten - Category D.

   Note: This game points out the inequalities in incomes and food-buying abilities in the U.S. Since the focus of the game is on understanding the difficulties of caring for a family on a poverty-level income, the game does not attempt to simulate the actual proportions of Americans in each income category.

2. Explain to the group that you will be playing a simulation game based on budgeting and spending monthly income. Choose three persons to be Helpers. (One may be yourself.) The Landlord will take possession of the Rent Receipt Cards. She or he will be responsible for "selling" these to the Players (one per Player; Players must pay for rent appropriate to their category). The Utility Company Representative will take the Utility Receipt Cards and be responsible for selling these to the Players (one per Player; category of Player and Receipt must be the same). The Food Store Worker will take the Weekly Meal Tickets and be responsible for selling these to the Players (four per Player, category of Player and Meal Ticket must be the same).

   Randomly divide the other students into Player Categories A to D in the proportions described in Step 1. Distribute a copy of the appropriate Player Description Sheet to each child. Ask the children to read their descriptions. Explain the different roles and answer any questions. Tell the Players to keep the sheets with them in case a Helper needs to see proof of category before completing a purchase.

3. Distribute the paper money to the Players so that each Player receives the correct amount of "Monthly income." (If there is surplus money, you may want to give this to the Helpers to use as change). Explain that each Player is responsible for taking care of his or her "family's" expenses with this sum. Distribute the Budgeting Worksheets (and pencils as needed). Go over these. Make sure all persons understand their roles, the costs of the necessities of rent, utilities, and food for their families, how to fill in the Budgeting Worksheet, and how to purchase the Weekly Meal Tickets, Rent Receipt Cards, and Utility Receipt Cards.

   Each Player has the freedom to spend, save, or plan to spend this money in any manner she or he chooses, but the object of the game is to take care of a family's needs for a month.

4. Encourage Players to attempt to balance their budgets by planning them on paper before making any purchases. Prepare the Players for the possibility that some Players may not be able to afford to fill every category while others may have extra money. Begin the game.

5. When everyone has made all the purchases and filled in the worksheets as completely as possible, bring the group back together and discuss. Have one or two volunteers from each of the four categories go over their worksheets out loud with the group. Compare the different purchases and planned purchases. How did the members of Categories C and D spend their incomes? Were they able to provide a balanced diet for the full four weeks? How did the Players in Categories A and B spend their incomes? What did they plan to do with the money left over? Discuss how the game related to real life, what it would be like to live from month to month on a low income like the persons in Category C and D, what it would be like to live like the family in Category A, why there is so large a range of incomes, and possible ways to end the poverty and hunger of Americans.

6. Journals - Provide time for the children to place their worksheets and descriptions in their journals and to make entries about how it felt to try to budget income and take care of a family.

Evaluation

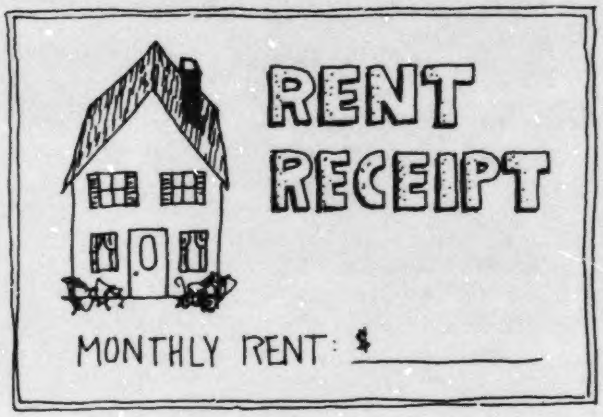
Given an opportunity to participate in a simulation, students will complete a budgeting worksheet.

Recommended Reference Material

Todd: Growing Up In Appalachia, film, 12 minutes, U of M (#5s1367) (1970). Describes the moral dilemma of an Appalachian boy when he finds a purse full fo food stamps. Heightens children's awareness of how other people live. To order, See RESOURCE GUIDE, page 63.

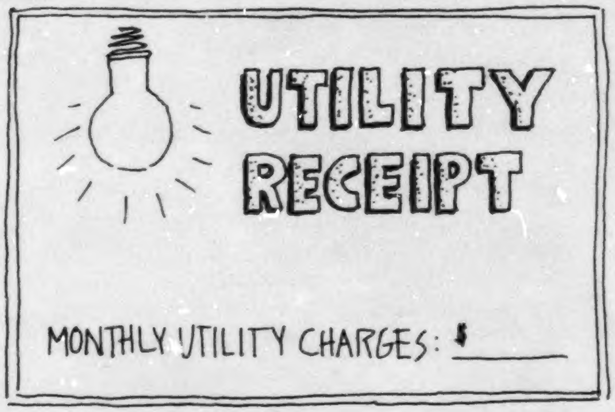
"Minnesota Poverty - The Measure of Poverty," Report 1, Minnesota Department of Economic Security, April 1983. To order, see RESOURCE GUIDE, page 77.

SAMPLE RECEIPTS, MONEY, AND TICKETS



RENT RECEIPT

MONTHLY RENT: $ ________



UTILITY RECEIPT

MONTHLY UTILITY CHARGES: $ ________

PLAYER DESCRIPTION SHEET A
STEPHEN STEPHENSON

Pretend you are Stephen Stephenson (35 years old), butler and housekeeper for Tom Trueblood (42 years old), banking executive, and his family. The family includes wife and mother Elizabeth Trueblood (40 years old), who is not employed, and five children: (James (15), Susanne (13), Sandra (11), Michael (9), and Patricia (6).

The Truebloods live in a large 20-room condominium in an elegant district of a city. Your job is to attend to the day-to-day household tasks and budgeting for the family.

Budgeting information

1. The Trueblood's monthly income is $15,000.
2. The monthly rent is $2,000. (This is often called a maintenance fee).
3. Utility charges for one month in the winter are $350. (This includes heat, hot water, and electricity for lights and appliances.)
4. Cost of meals for one week:
    - o **Gourmet meals** for a week for the family cost $350. (This includes steak, lobster, special desserts, fine wines, imported cheeses, all varieties of vegetables, all types of dairy products, special bakery breads and pastries, all varieties of fruits, and all varieties of meat, fish, and poultry.
    - o **Moderately priced meals** for a week for the family cost $140. (This includes ground beef, poultry, cheese, milk, in-season vegetables, in-season fruits, bread, grains, some snack foods, some desserts.)

- **Subsistence meals** for a week cost $55. (This includes potatoes, beans, rice, bread, some soup, occasionally some other food varieties).

PLAYER DESCRIPTION SHEET B
SAM OHITO

Pretend you are Sam Ohito (34 years old), a part-time teacher at a nearby community college. Your wife, Anita Ohito (36 years old), is an engineer. You have one daughter, Lisa (10). You and your wife share most of the household responsibilities. You are usually in charge of monthly budgeting. You live in a modern two-bedroom apartment in a suburban area.

Budgeting Information

1. The Ohito family's monthly income is $1,500.
2. Monthly rent is $600.
3. Utility charges for one month in the winter are $100. (This includes heat, hot water, and electricity for lights and appliances.)
4. Cost of meals for one week:
   - **Gourmet meals** for the family for one week cost $150. (This includes steak, lobster, special desserts, fine wines, imported cheeses, all varieties of vegetables, all types of dairy products, special bakery breads and pastries, all varieties of fruits, and all varieties of meat, fish, and poultry.
   - **Moderately priced meals** for the family for one week cost $60. (This includes ground beef, poultry, cheese, milk, in-season vegetables, in-season fruits, bread, grains, some snack foods, and some desserts.)
   - **Subsistence meals** for one week cost $25. (This includes potatoes, beans, rice, bread, some soup, occasionally some other food varieties.)

PLAYER DESCRIPTION SHEET C
BERTHA BROWN

Pretend that you are Bertha Brown (40 years old), part-time cashier at a fast-food hamburger restaurant. You are divorced. You have three children: Jessica (11), Billy (8), and Leroy (6). You live in a small two-bedroom apartment in an old, rundown section of a large town.

Budgeting information

1. Monthly income is $350.
2. Monthly rent costs $175.
3. Utility charges for one month in the winter cost $40. (This includes heat, hot water, and electricity for lights and appliances.)
4. Costs of meals for one week:
   - **Gourmet meals** for the family for one week cost $200. (This includes steak, lobster, special desserts, fine wines, imported cheeses, all varieties of vegetables, all types of dairy products, special bakery breads and pastries, all varieties of fruits, and all varieties of meat, fish, and poultry.)
   - **Moderately priced meals** for the family for one week cost $80. (This includes ground beef, poultry, cheese, milk, in-season vegetables, in-season fruits, bread, grains, some snack foods, and some desserts.)

- **Subsistence meals** for one week cost $35. (This includes potatoes, beans, rice, bread, some soup, and occasionally some other food varieties.

PLAYER DESCRIPTION SHEET D

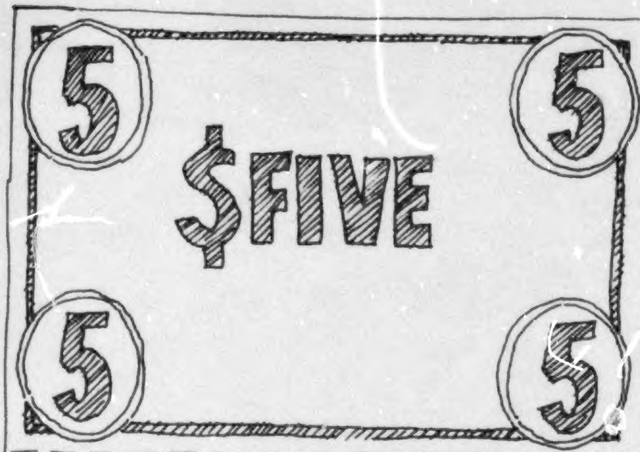
MILLIE MILLICHSKY

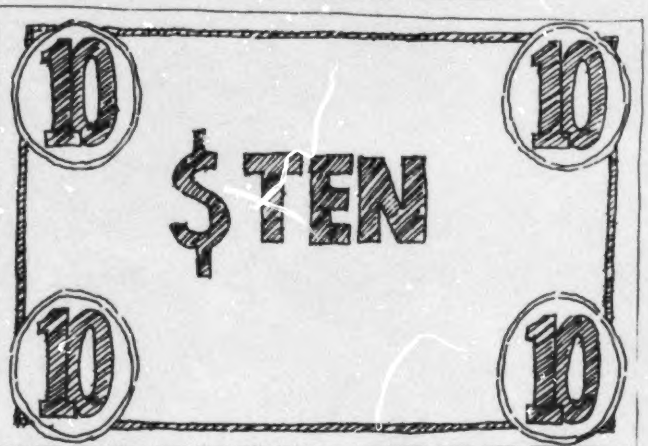
Pretend you are Millie Millichsky (70 years old). You are not employed. You are the widow of a retired shopkeeper who died three years ago. You live alone in a tiny apartment in a decaying section of an old city.

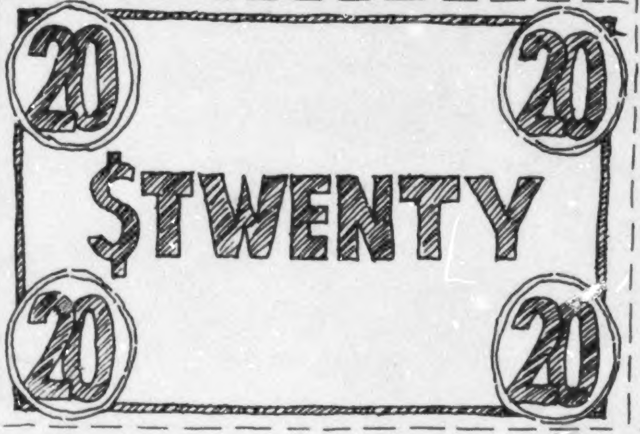
Budgeting Information

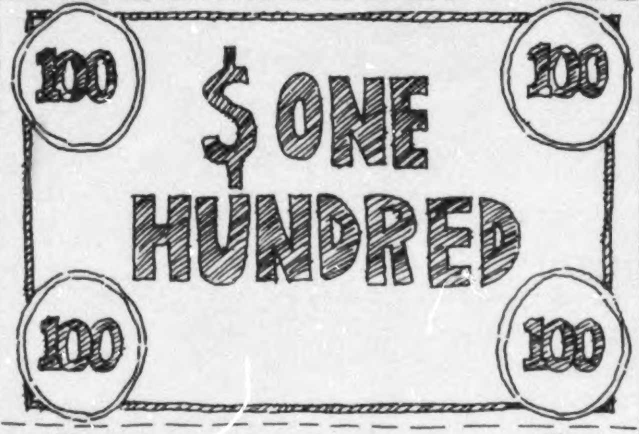
1. Monthly income is $150.
2. Monthly rent costs $100.
3. Utility charges for one month in the winter cost $25. (This includes heat, hot water, and electricity for lights and appliances.
4. Cost of meals for two weeks:
   - **Gourmet meals** for one week cost $50. (This includes steak, lobster, special desserts, fine wines, imported cheeses, all varieties of vegetables, all types of dairy products, special bakery breads and pastries, all varieties of fruits, and all varieties of meat, fish, and poultry.)
   - **Moderately priced meals** for one week cost $20. (This includes ground beef, poultry, cheese, milk, in-season vegetables, in-season fruits, bread, grains, some snack foods, and some desserts.)
   - **Subsistence meals** for one week cost $10. (This includes potatoes, beans, rice, bread, some soup, and occasionally some other food varieties.)

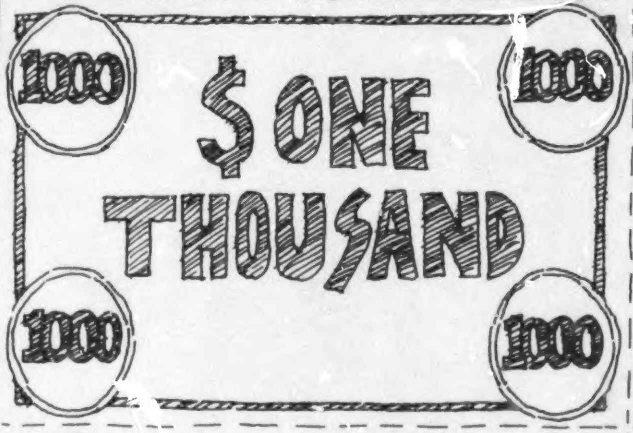
SOURCE: Food First Curriculum, Institute for Food and Development Policy, 1984.

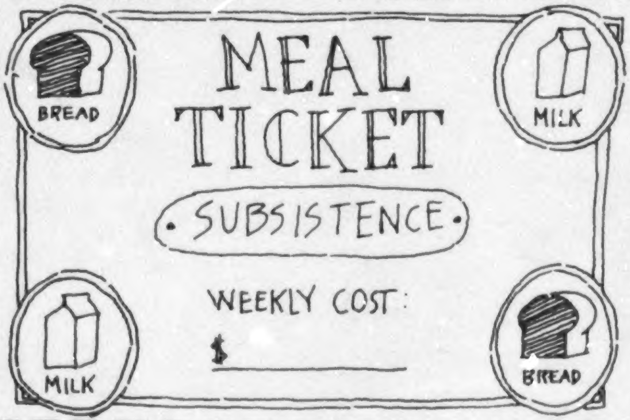

5
5
$FIVE
5
5

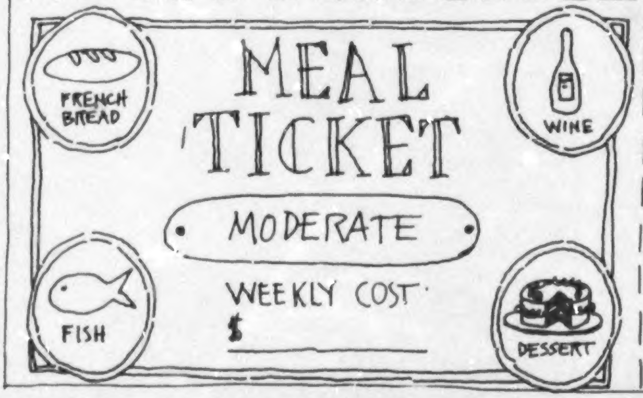

10
10
$TEN
10
10

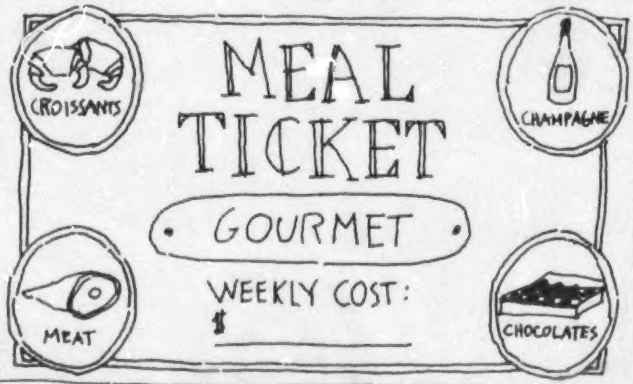

20
20
$TWENTY
20
20


100
100
$ONE HUNDRED
100
100


1000
1000
$ONE THOUSAND
1000
1000


BREAD
MEAL TICKET
MILK
SUBSISTENCE
WEEKLY COST:
$
MILK
BREAD


FRENCH BREAD
MEAL TICKET
WINE
MODERATE
WEEKLY COST:
$
FISH
DESSERT


CROISSANTS
MEAL TICKET
CHAMPAGNE
GOURMET
WEEKLY COST:
$
MEAT
CHOCOLATES

WHO IS HUNGRY IN THE U.S.A.?

Description

Children will read and discuss a personal account of the life of a hungry aged American.

Learner Objective

Students will be able to identify one group of Americans who are affected by hunger - the aged.

Background

See Curriculum Framework VII, pages 7 and 8.

There are two general groupings of hungry people. The first group contains able-bodied people who cannot afford to feed themselves either because they cannot find jobs or because their jobs do not pay them well enough to live on.

The second group contains people who are not able to feed themselves - the very young, the very old, some very disabled persons, and those who are very ill.

Materials

- Copies for everyone of the story found on Component 22 Activity Sheet B, from Learning Packet Starving in the Shadow of Plenty, by Loretta Schwartz-Nobel (New York: The Putnam Publishing Group, 1981).

Activity

1. Explain to the group that they will be reading and discussing a personal account of a hungry aged American. Discuss the older people students already know or are familiar with and whether or not these people might be hungry. Distribute copies of the story.
2. Ask the children to read the story.
3. When everyone has finished reading, discuss the story, what life is like for older people in the United States, the number of aged persons who go hungry (15 percent of the aged in America live under the poverty line), the causes of their hunger, possible solutions, and other groups of Americans that contain a large proportion of hungry persons.

   Have the group consider the fact that there are two general groupings of hungry people. The solutions to each group's hunger will be different.
4. Journals - Provide time for putting the stories into journals and making entries about thoughts and feelings about the realities of hunger for aged Americans.

Evaluation

Given a story and discussion questions, students will suggest possible causes for existing hunger in America.

Recommended Reference Material

"Minnesota Poverty - The Face of Poverty," Report #2, August 1983. "Minnesota Poverty - The Poor and the Economy," Report #3, March 1984. To order, see RESOURCE GUIDE, page 76.

WHO IS HUNGRY IN THE U.S.A.?

Description

The children will look at unemployment statistics and consider why some groups of Americans have more trouble finding jobs that others, and how this relates to their ability to buy food. Students will complete a bar graph on unemployment.

Learner Objective

Students will be able to recognize the relationship between being employed and being able to buy food for oneself and one's family.

Background

See Curriculum Framework VII, pages 7 and 8.

STATISTICS ON POVERTY FROM THE 1980 U.S. Census:

Category of People	Below Poverty Line
All	12.1%
White	9.2%
Black	28.9%
Native American	26.6%
Asian/Pacific Island	12.8%
Hispanic	23.1%

The poverty line is an arbitrary income level developed by the Census Bureau. It is equal to three times a minimum cost emergency food plan. In 1980, a family of four earning less than $8,414 per year (1983, $9,862) was considered to be living below the poverty line.

STATISTICS ON POVERTY FROM "MINNESOTA POVERTY - The Measure of Poverty" Report #1, April 1983.

YOUR CHANCES OF BEING POOR

In Minnesota in 1980 your chances were one in eleven that you would be poor,

- If you were a woman raising children along and there was a child under 6 the chances were 1 in 2;
- If you were Indian the chances were 1 in 3;
- If you were a woman raising children alone the chances were 1 in 3;
- If you were Black or Asian the chances were 1 in 4;
- If you did not live with a family member the chances were 1 in 4;
- If you were Hispanic the chances were 1 in 5;
- If you were over age 65 the chances were 1 in 7;
- If yours was a family with children the chances were 1 in 8.

Poverty is measured by the government using guidelines based on cash income and family size which are adjusted annually for changes in the cost of living. In 1983, a family of four is considered poor if their cash income is less than $9,900 per year, $825 per month, $190 per week, $6.80 per day per person.

Materials

- Copies for everyone of Component 22 Activity Sheet C from Learning Packet, "Working and Eating."

Activity

1. Explain that the group will be looking at unemployment statistics broken down by people's race, sex, and age. Discuss what unemployment is. Ask for the children's ideas on how unemployment is related to hunger. Explain that most people go hungry because they cannot afford to buy enough food. Being unemployed makes it very hard to have enough money to buy food for one's family. Ask for students' ideas on whether people of different sexes, races, or ages have different unemployment rates.

2. Distribute Component 22 Activity Sheet C. Help the children fill out the bar graph.
3. Discuss the statistics, what types of people have higher rates of unemployment, what types have lower rates, why this might be so, how the inequalities could be employed. Also, discuss the concepts of prejudice and discrimination.
4. Journals provide time for entries on how unemployment and hunger are related and on why some groups of Americans are more often hungry than other groups.

Evaluation

Given data, students will graph the percent of the labor force which is unemployed.

Recommended Reference Material

Film: "The Price of Abundance," color; 29 minutes. See RESOURCE GUIDE, page 66. Film: "Generations of The Land;" color; 27 minutes. See RESOURCE GUIDE, page 66.

Extended Activity

1. Explain to the children that they are all going to work together to create a scene depicting who's hungry in Minnesota. Review the groups of people who most commonly go hungry in this country, for example: Children, seniors, women, Native Americans, Hispanics, Black Americans, and other people of color. The group should decide either to put all the types of people into a common scene (for example, a soup kitchen or welfare office) or to work on four or five mini-scenes, each showing the surroundings of one group of hungry Americans.
2. Have the group agree on a set of rules for working together on a drawing. Possible rules: (1) Each child will be responsbile for drawing one thing that fits proportionately into the rest of the drawing. (2) No more than five children at the drawing at one time. (3) Children should know what they plan to draw before they take their turns. Also, decide on a fair order for children to come up and draw.
3. Start the drawing or have a volunteer start. Give everyone a chance to participate.
4. When the last child has contributed to the scene, discuss the results, how well the picture depicts the scene decided on, and how the process of group drawing worked.
5. Distribute writing materials as needed. Ask each child to write one or two paragraphs on one group of hungry Americans discussing who they are, where they live, why they are hungry, and possible ways to end hunger.
6. Journals - Allow time for the children to put their paragraphs in their journals and to make entries on how it felt to collaborate on a group drawing.

SECTION 7
LEARNING PACKET

LAND UTILIZATION; WORLD FOOD NEEDS

COMPONENT 21 Why Are People Hungry? (6)

COMPONENT 22 Who's Hungry in the USA? (6)

COMPONENT 21
ACTIVITY SHEET A

CURRICULUM PRETEST

1. Is there enough food grown in the world today to feed all the people?
_____ Yes _____ No

2. How many people go hungry in this world?
_____ Everyone (100%) _____ 1 out of 100 persons (1%)
_____ 1 out of 4 persons (25%) _____ No one (0%)
_____ 1 out of 10 persons (10%)

3. Can there be more than one correct way to describe an event?
_____ Yes _____ No.

4. Think about the food you ate yesterday. Where was it grown?
_____ Your neighborhood
_____ Your state (including your neighborhood)
_____ All over the United States (including your state)
_____ Around the world (including the United States)

5. Compare the number of farmers in the United States now with the number of farmers 100 years ago. Are there:
_____ More farmers today
_____ The same number of farmers today
_____ Fewer farmers today

6. Many types of food we find in the supermarket are made by the same few food manufacturing companies. What percentage of all the breakfast cereals, all the canned soups, and all the packaged cookies are made by just one to four food companies?
_____ 100% _____ 75% _____ 50% _____ 25% _____ 0%

7. Which people in the United States are more likely to be hungry? Check one of each pair below.
_____ People of European ancestry or _____ Native Americans
_____ Men or _____ women
_____ People over 70 years old or _____ people 30 to 40 years old
_____ People 1 to 15 years old or _____ people 20 to 30 years old

8. There are many more people in the world today than there were 100 years ago. Compare the number of people now deciding what food will be grown and for whose benefit to the number of people deciding this 100 years ago. Are there:
_____ More people deciding
_____ The same number of people deciding
_____ Fewer people deciding

9. Is it possible to make changes in this world?
_____ Yes _____ No

10. In the task of working to end hunger, what group of people is most important?
_____ Scientists _____ Farmers
_____ Ordinary people like you or me _____ Businesspeople

SOURCE: Food First Curriculum - Institute for Food and Development Policy - 1984

COMPONENT 21
ACTIVITY SHEET B

WHY ARE PEOPLE HUNGRY?

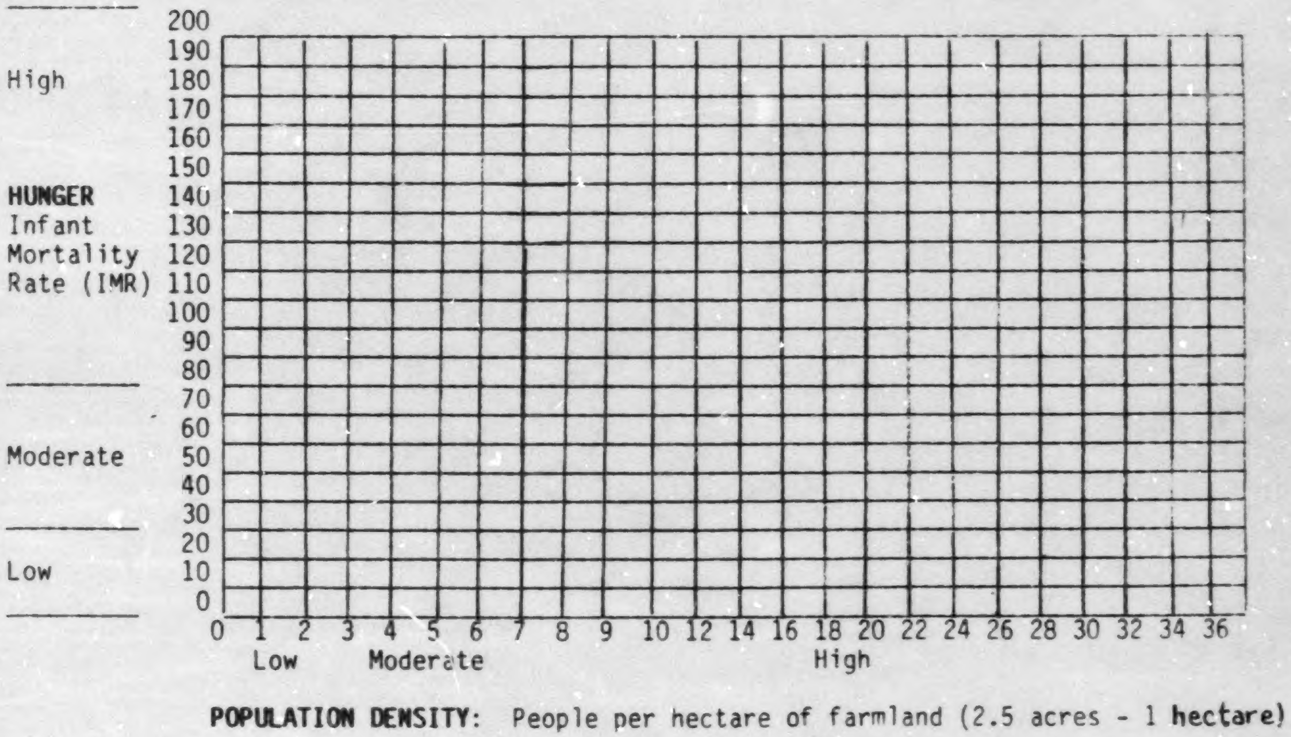
LEARNER OBJECTIVE:

Students will be able to demonstrate the concept of a root cause of a situation.

CAUSES OF WORLD HUNGER	POSSIBLE ROOT CAUSES

COMPONENT 21
ACTIVITY SHEET C

WHAT DO THE NUMBERS MEAN?



INFORMATION FOR GRAPHING

Continent and Country	Density*	IMR**	Color
North America			
1. U.S.A.	1	13	
Central American			
2. Guatemala	4	76	
Europe			
3. Poland	2	22	
4. France	3	11	
Additional Countries			

Continent and Country	Density*	IMR**	Color
Asia			
5. Bangladesh	9	153	
6. Japan	33	8	
Africa			
7. Ethiopia	2	162	
South America			
8. Brazil	3	64	
Additional Countries			

*Number of people per hectare of permanently cropped and arable land.

**Annual number of deaths per 1,000 live births to infants under the age of one year.

SOURCE: Food First Curriculum - Institute for Food and Development Policy, 1984

WORKSHEET QUESTIONS

1. Which country has the highest infant mortality rate?

2. Which country has the lowest infant mortality rate?

3. Which country has the highest population density?

4. Which country has the lowest population density?

5. Which countries have high infant mortality rates and high density?

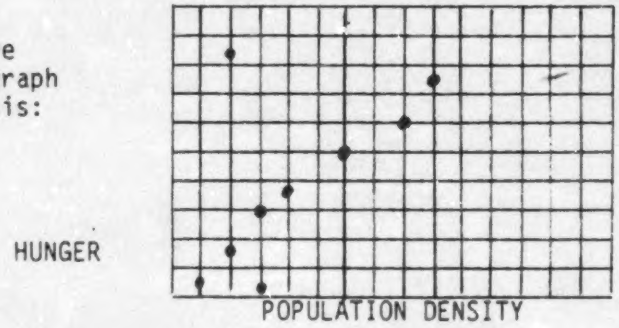
6. Which countries have low infant mortality rates and high density?

7. Which countries have high infant mortality rates and low density?

8. Which countries have low infant mortality rates and low density?

SAMPLE GRAPH

If hunger and population were positively correlated, the graph would look something like this:



9. Does there seem to be a pattern between the two numbers? If so, the points you plotted would look something like a line. Or do the numbers seem unrelated? If so, the points in the graph will be in all different places.

SOURCE: Food First Curriculum - Institute for Food and Development Policy, 1984

COMPONENT 22
ACTIVITY SHEET A

BUDGETING WORKSHEET

1. Category: ____________________

2. Name of role you are playing

____

3. Size of family ________________

4. Monthly income ________________

Costs of possible expenses

5. Monthly rent ______

6. Monthly utility charges

	1 week	4 weeks
7. Cost of gourmet meals	______	______
8. Costtof moderate meals	______	______
9. Cost of subsistence meals	______	______

Note: You have the choice of buying four weeks of one type of meal or buying different types of meals each of the four weeks.

Planned Expenses for One Month

10. Rent __________

11. Utilities __________

Meals:

12. Week 1: Type ____________________ Cost __________

13. Week 2: Type ____________________ Cost __________

14. Week 3: Type ____________________ Cost __________

15. Week 4: Type ____________________ Cost __________

16. Total cost of planned expenses __________

17. Monthly income (line 4) __________

18. Less total planned expenses (line 16) __________ (subtract)

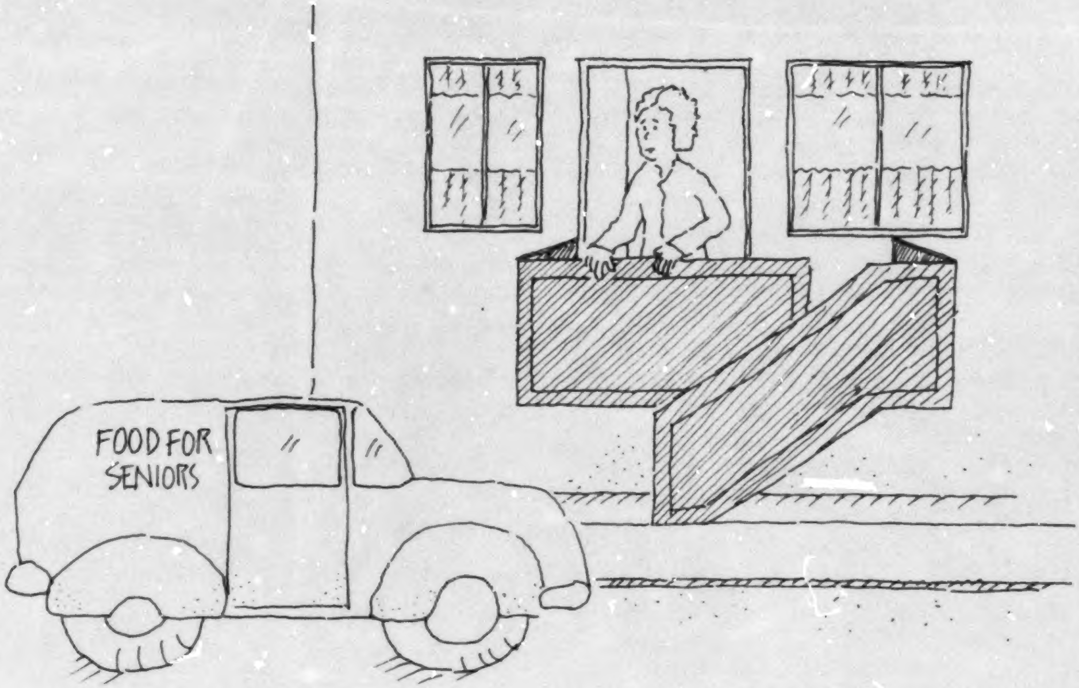
19. Money left over for other living expenses __________

20. If you have left-over money, list some of the additional things you might buy. Examples: clothing, movies, books. If you could not afford all items, list the ones you decide not to buy.

SOURCE: Food First Curriculum - Institute for Food and Development Policy, 1984

COMPONENT 22
ACTIVITY SHEET B

OLD AND HUNGRY



An emaciated woman pulled at the edges of a torn gray sweater; her bony fingers were red in the cold. She leaned heavily on the porch railing for support. Her body was still but her large bright blue eyes darted back and forth. Her head turned less quickly, and because she was so thin, the muscles and tendons of her neck stood out. She was waiting for food. As the car eased to the curb below her porch on Weld Hill Street in Boston, the woman began to come down the steps, with what seemed like almost frantic gestures. She was at the door of the car as the director of the Ecumenical Senior Citizens' lunch program turned off the engine.

"How are you today?" the director asked politely, handing her the packaged lunch and starting to close the car door before the woman could respond.

"I'm very weak," the woman said quickly. The words were clipped, the voice high and nervous, with a Boston-Irish accent. Although she spoke well, as a person who was educated, there was fear in her voice and in everything else about her.

At 62, she was almost a living skeleton, her eyes were framed by huge dark circles, but the ashen skin, stretched tightly, still revealed a small, upturned nose and finely shaped lips which made it clear that she had once been beautiful.

"I need help. Will you come back? You must come back," she pleaded, her voice trembling.

"You know that we're very busy and we have a lot of other meals to deliver," the director answered as she turned the key in the ignition.

"I'll come back," I said as the car drove off.

I went back later that afternoon.

The woman explained to me that once she had done civil-service work in City Hall, then had served with the Boston School Committee as a legal secretary.

She lost her job several years ago, and after her unemployment compensation ran out she received welfare for a while. But then the Welfare Department told her that, due to cutbacks in their budget, they could no longer help her. They said she could work, and she said she wants to work, but no one will hire her.

"I've had no income and I've paid no rent for many months. My landlord let me stay. He felt sorry for me because I had no money. The Friday before Christmas he gave me ten dollars. For days I had nothing but water. I knew I needed food; I tried to go out but I was too weak to walk to the store.

"I felt as if I was dying. I saw the mailman and told him I thought I was starving. He brought me food and then he made some phone calls and that's when they began delivering these lunches. But I had already lost so much weight that five meals a week are not enough to keep me going.

"I just pray to God I can survive. I keep praying I can have the will to save some of my food so I can divide it up and make it last. It's hard to save because I am so hungry that I want to eat it right away. On Friday, I held over two beans from the lunch. I ate one bean on Saturday morning. Then I got into bed with the taste of food in my mouth and I waited as long as I could. Later on in the day I ate the other bean.

"Today I saved the container that the mashed potatoes were in and tonight, before bed, I'll like the sides of the container.

"When there are bones I keep them. I know this is going to be hard for you to believe and I am almost ashamed to tell you, but these days I boil the bones till they're soft and then I eat them. Today there were no bones."

Upstairs, the old double bed was filled with neatly stacked piles of papers. The woman told me that they were mostly copies of letters she had written to the Social Security office, the Department of Public Welfare, and to local church groups and lawyers, pleading for food. Social workers from local social service agencies claimed that they had done all that they could. They said that they tried repeatedly to help her but that she had failed to qualify or had been unwilling to follow their rules.

I walked into the small clean kitchen and opened the refrigerator. Except for the container with the bit of mashed potatoes left from lunch, it was empty. There was absolutely no food in any of the cupboards.

Copyright 1981 by Loretta Schwartz-Nobel.
Reprinted by permission.

QUESTIONS FOR DISCUSSION

1. Why is this woman hungry?

2. Seniors often have more trouble getting enough food than other adults do. Why do you think this is so?

3. Sometimes adults under 65 years go hungry, too. How is their problem different from this woman's? How is their problem the same?

4. Children in the United States are often victims of hunger. How is their problem different from this woman's? How is it the same?

Action Ideas

1.) Research food stamps and other government programs for poor people.

2.) Find out what organizations in your community are doing to improve these programs for the aged residents of your area.

SOURCE: Food First Curriculum - Institute for Food and Development Policy, 1984

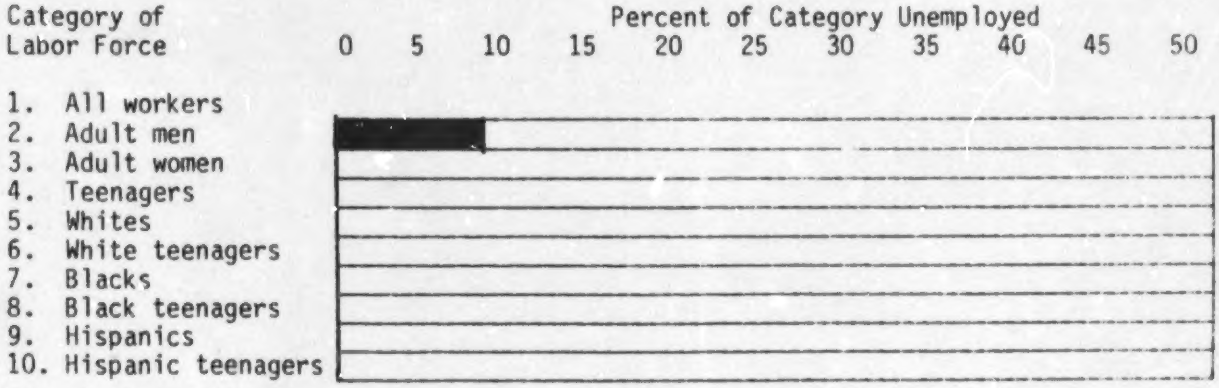
COMPONENT 22
ACTIVITY SHEET C

WORKING AND EATING

People go hungry because they cannot afford to buy adequate food. This worksheet will show that some groups of people are more likely than others to be too poor to buy enough food. People who cannot find jobs often cannot afford to buy enough food. So unemployment and hunger often go together.

A. Use the unemployment statistics to complete the bar graph below.

Category of Labor Force	Percent of Category Unemployed	Category of Labor Force	Percent of Category Unemployed
1. All workers	9.9	6. White teenagers	20.6
2. Adult men	9.4	7. Blacks	20.7
3. Adult women	8.5	8. Black teenagers	51.1
4. Teenagers	23.3	9. Hispanics	14.1
5. Whites	8.8	10. Hispanic teenagers	26.6



B. Study the income statistics below and answer the following questions.

Median Weekly Earnings of Full-Time Employed Persons	Race	Males	Females
	All	$385	$252
	White	$398	$255
	Black	$291	$235
	Hispanic	$275	$223

1. Who earns more--Whites, Blacks, or Hispanics? ______________________________

2. Who earns the least--Whites, Blacks, or Hispanics? ______________________________

3. Who earns more--males or females: ______________________________

4. Why do you think there is such a big difference in incomes? ______________________________
____
____
____

SOURCE: Food First Curriculum - Institute for Food and Development Policy, 1984.